

FEBRUARY  
1937

MEMBER



# Rock Products

WHICH IS CONSOLIDATED WITH THE JOURNALS

**CEMENT & ENGINEERING NEWS** (Est. 1896)

**CONCRETE PRODUCTS** (Est. 1918)

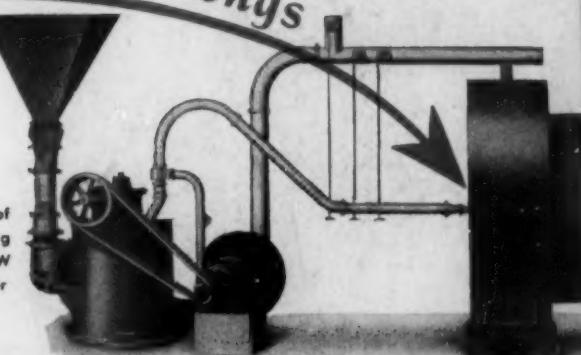
THE OLDEST PUBLICATION IN ITS FIELD AND THE RECOGNIZED AUTHORITY

FEB 16 1937

**Direct Firing  
would put  
This Pulverized Coal  
Into the Kiln**

*Where it Belongs*

Arrangement of  
a direct-firing  
system with B&W  
Type B Pulverizer



Above illustration was made from an un-retouched photograph of the vent above a storage system in a cement plant.

This is but one of several important savings realized with direct firing of rotary kilns. Others include: from 4 to 18 kw-hr. per ton of coal, and frequently from 10 to 15 lb. of coal per barrel of cement. Direct firing also eliminates the separate coal house with its expenses and explosion hazards.

THE BABCOCK & WILCOX COMPANY  
85 Liberty Street  
New York, N.Y.

**BABCOCK & WILCOX**

JANUARY, 1937

ROCK PRODUCTS

Handle Larger Rock

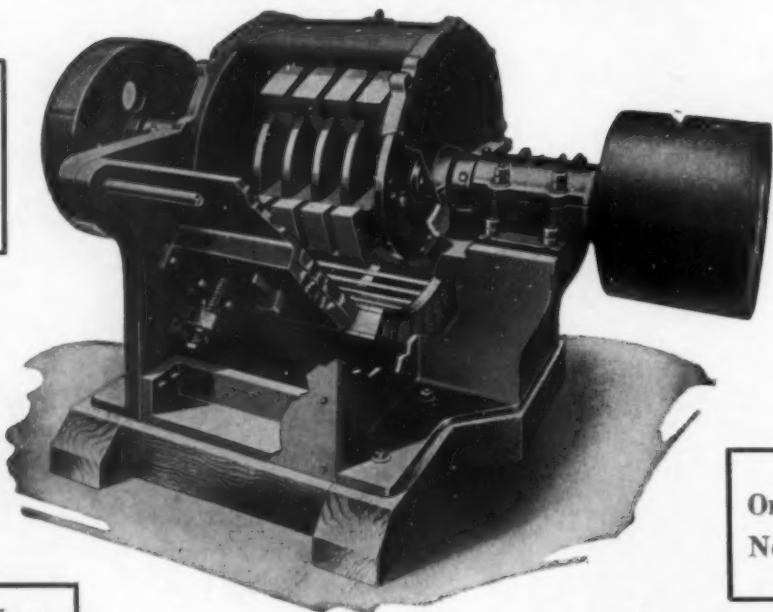
WHY  
MORE PLANTS  
ARE INSTALLING

Better Control Over  
Size of Product

• WILLIAMS •  
HAMMER CRUSHERS

Reduces to  
Desired  
Size • • •  
in one  
operation

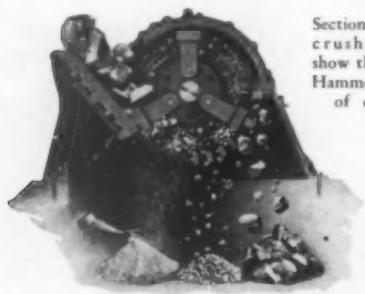
Jumbo Junior  
Crusher with sec-  
tion removed to  
show crushing  
parts.



25% to 75% Less  
Investment • • •  
Cheaper Crushing

Cubular  
Stone • • •  
No Slivers

Only One Crusher  
Needed for the Job



Sectional view of  
crusher used to  
show the Williams  
Hammer Principle  
of crushing.

If you plan additional rock crushing equipment investigate Williams Hammer Crushers. Usually one Williams will take the place of two or three other crushers at a considerable saving in investment and operating costs. Thirty sizes make it easy to select exactly the proper machine for your work. Large sizes handle power shovel loaded stone and crush to 2", 1 1/4" or smaller. Smaller sizes handle screen rejects or hand-loaded rock and reduce to 1 1/4", 3/4" or agstone. Get our recommendations on your crushing, pulverizing, screening or air separation job.

Write for illustrated bulletins . . .

The Williams Patent Crusher & Pulverizer Co.

800 St. Louis Avenue • ST. LOUIS, MO.

Sales Agencies in All Principal Cities Including

Chicago 37 West Van Buren	New York 15 Park Row	San Francisco 326 Rialto Bldg.
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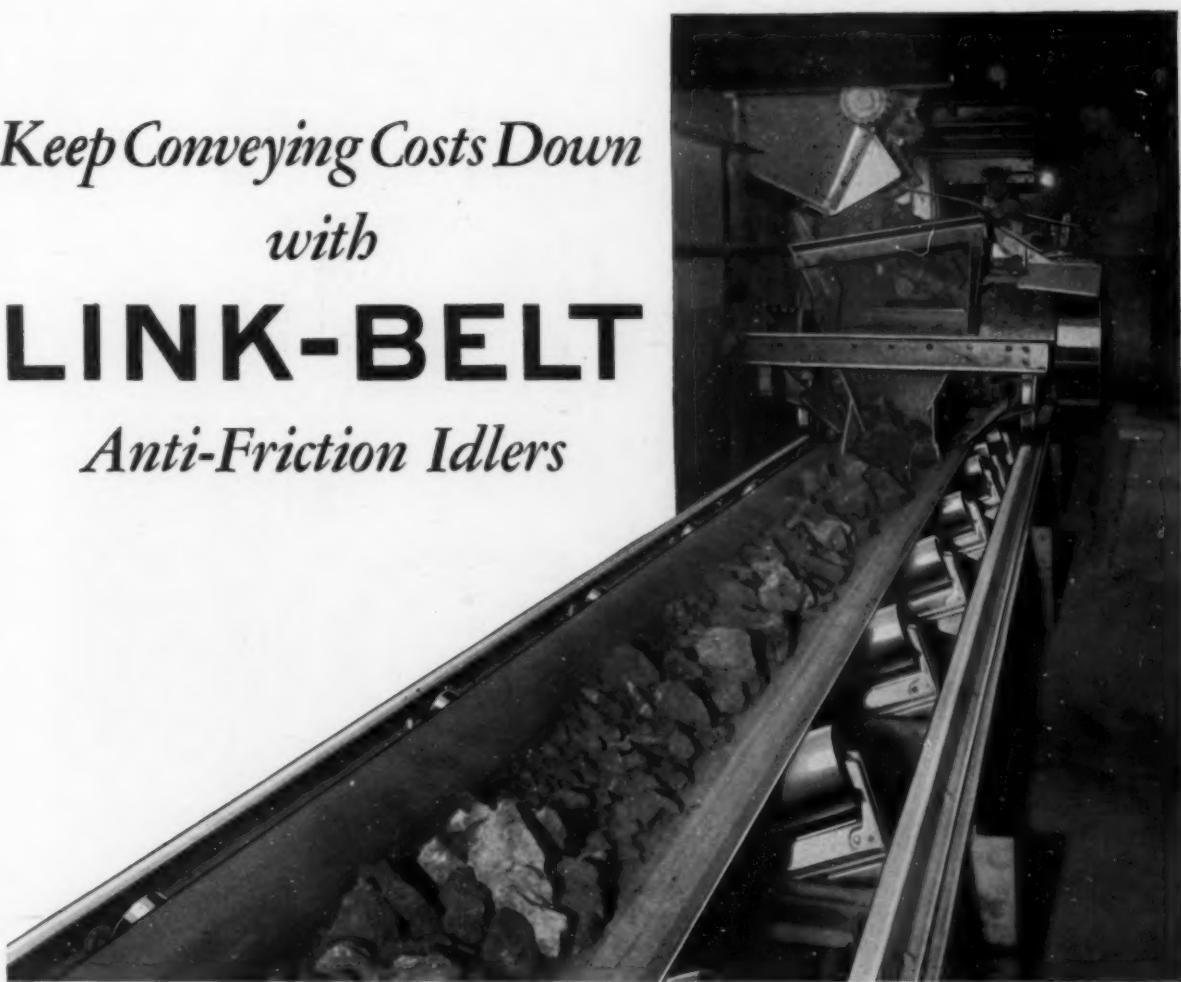


TAT 14 i 2000  
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD  
WILLIAMS  
PATENT CRUSHERS GRINDERS SHREDDERS

*Keep Conveying Costs Down  
with*

# LINK-BELT

*Anti-Friction Idlers*



Link-Belt 30-in. wide anti-friction belt conveyor fed by traveling manganese steel apron feeder handling run-of-mine copper ore.



POSITIVE SELF-ALIGNING IDLER

This Link-Belt positive self-aligning idler automatically and positively maintains troughed conveyor belts central at all times. It has met with unqualified success, and is preferred by many who have heretofore used the counterweighted disc type of self-aligning idler.



Free turning, accurately made idlers assure the belt conveyor a good roadbed for economical operation . . . minimum friction loads . . . long belt life . . . and the lowest maintenance cost. Link-Belt makes a full line of anti-friction pressure lubricated idlers, as well as all necessary machinery and driving parts for the complete conveyor.

Submit your conveying and power transmission problems to Link-Belt. Send for catalog. Address Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our offices located in principal cities.

# Rock Products

*With which is consolidated the journals*

## CEMENT and ENGINEERING CONCRETE N E W S PRODUCTS

Founded 1896

Est. 1918

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RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

February, 1937

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(Rock Products is indexed in the "Industrial Arts Index," which can be found in any Public Library)

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### TRADEPRESS PUBLISHING CORPORATION

205 West Wacker Drive, Chicago, Illinois, U. S. A.

NATHAN C. ROCKWOOD, President; J. L. FRAZIER, Secretary

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SUBSCRIPTION—Two dollars a year to United States  
and Possessions. \$2.00 a year to Canada and  
\$4.00 to foreign countries. Twenty-  
five cents for single copies

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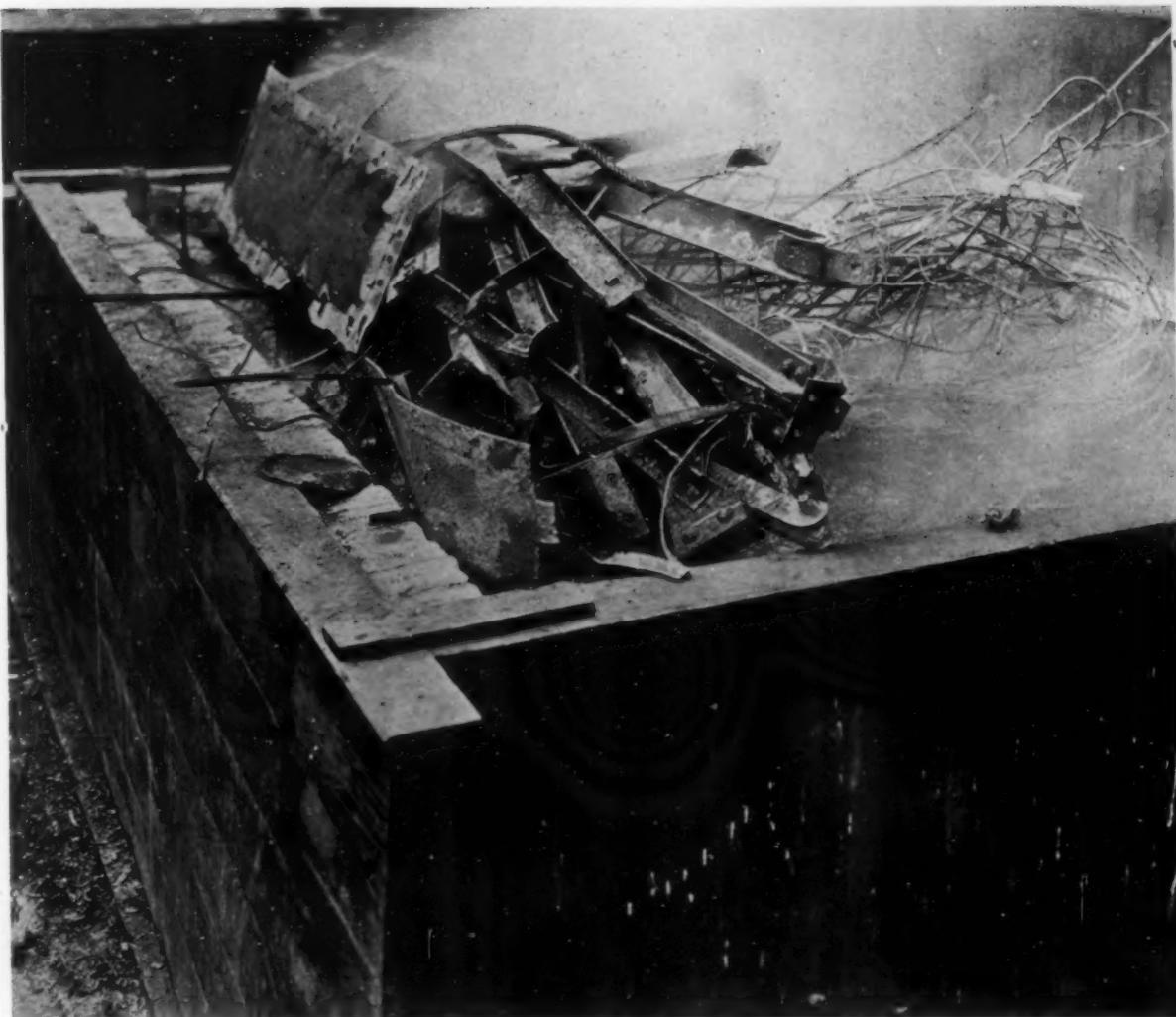
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## **WITCHES' CAULDRON —MODERN STYLE**

*A typical example of Goodrich improvement in rubber*

**BANG!** Gouging, crushing—another ton of scrap iron is hurled into 3,000 gallons of boiling acid, to be dissolved in the making of ferric chloride. The tank has been standing it 4 years, without a leak or a penny for repairs.

Formerly all such tanks were made of wood—the only material that could begin to stand the punishment. But the wood soon leaked—wasting acid, endangering workers, causing constant repair expense until it had to be replaced.

Then Goodrich found a way to attach rubber to steel with an inseparable bond. Immediately the chemical industry and a dozen more seized upon the discovery. Now chemical process, storage, steel pickling and plating tanks are made of sturdy steel, lined with Goodrich rubber sometimes sheathed with brick.

The special Goodrich bond never comes loose . . . and these Goodrich tanks never leak, need no repairs, and apparently will last indefinitely. Where-

ever Goodrich tanks are used, costs are cut, safety is increased, maintenance is saved, depreciation reduced to the minimum . . . typical results of the use of any Goodrich product—belting, hose, packing—because Goodrich research is constantly making every one of them a better product—a better value for industry. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

**Goodrich**  
*ALL products problem IN RUBBER*

# JACK FROST won't even



## *slow* them down

Compressors left out in winter need lubricants with a low pour point. Texaco Compressor Oils are free-flowing at zero temperatures, yet provide high lubricating efficiency.

Air tools aren't sluggish for long—even on coldest mornings—when lubricated with Texaco Lubricants.

YOUR compressors and air tools will keep operating as they do in mild weather—once you've put them on the right grades of Texaco Compressor Oils.

Texaco Cetus, Alcain, and Algol for compressors have such a low pour point they flow freely even at zero.

Using Texaco Oils, your compressors will start up readily after a cold night . . . air tools will attain normal speed quickly.

Although free-flowing, these lubricants possess superior lubricating qualities. Switch to Texaco, and forget Jack Frost.

Any Texaco representative will gladly provide practical engineering service to prove the economy of Texaco Compressor Oils.

THE TEXAS COMPANY  
135 East 42nd Street, New York City

Nation-wide distribution facilities  
assure prompt delivery



## TEXACO Industrial Lubricants

# Thermoid

## CONVEYOR BELTING

# at work



**HOSE  
BELTING  
PACKINGS  
BRAKE LININGS**

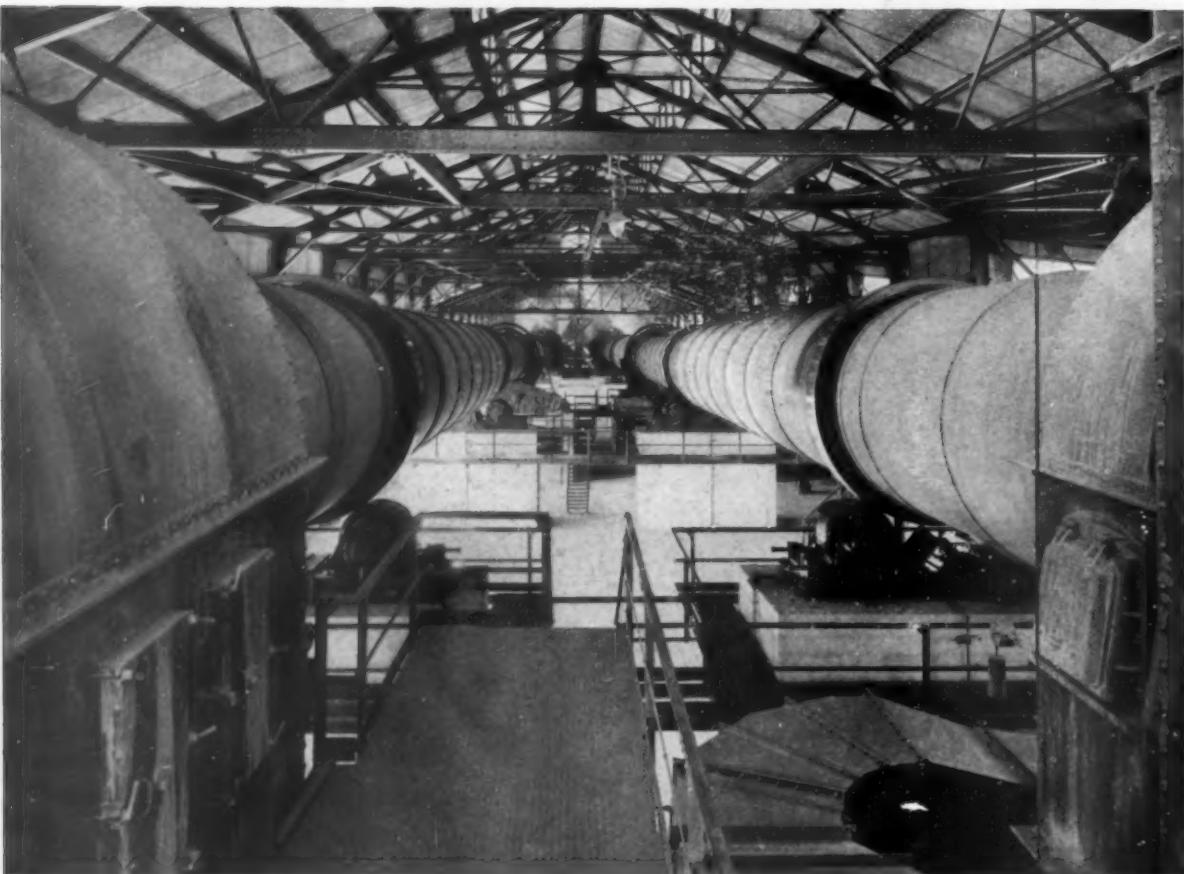
Thermoid Conveyor Belting has grown up in the quarries where both men and machinery have to be good to last. Years of first-hand study of service conditions have given Thermoid engineers the knowledge necessary to build belting that will "stand the gaff". Ordinary rubber impregnated duck may look good enough for the job, but actual service soon proves that it isn't satisfactory. Conveyor belting demands the finest quality duck; and this *specially woven* fabric needs *special* impregnation with *specially* compounded rubber, tested for its ability to resist bruising and abrasion from sharp objects. That's how Thermoid Conveyor Belting is built.

THERMOID RUBBER CO., DIVISION OF THERMOID CO., TRENTON, N. J.

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# ROTARY KILNS

With integral Coolers, such as the UNAX  
cooler or the UNAX GRATE cooler



**F. L. SMIDTH & Co.**

225 BROADWAY

NEW YORK, N. Y.

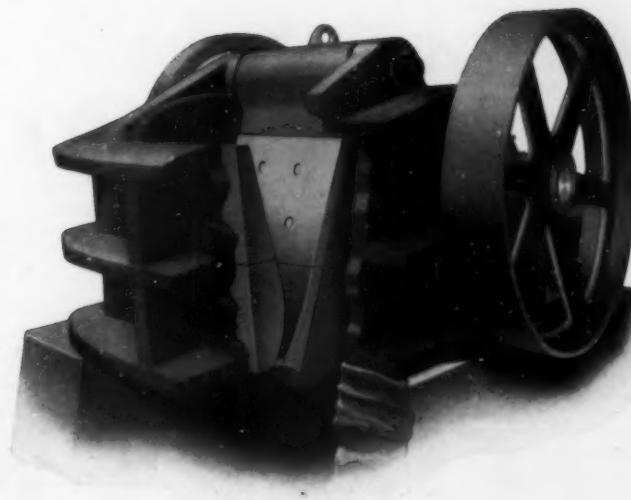
CEMENT MAKING MACHINERY  
CEMENT PLANT ENGINEERING

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• • •

*investigate*  
**THE**  
**TRAYLOR**  
**TYPE H**  
**BLAKE**  
**JAW**  
**CRUSHER**

• •



The Traylor Type H Jaw Crusher is a form of the old reliable Blake Crusher thoroughly modernized—with reinforced welded steel frame, which is lighter and much stronger than any cast frame can be, and Traylor Patented Curved Jaw Plates of a design that employs the principle of the Traylor Non-Choking Bell Heads and Concaves that operators have found so profitable to use.

The Type H breaker is not a reduction crusher, in a strict sense but it will crush much finer at a greater capacity than older designs, with no increase in power, and it cannot choke, which results in great economy of wearing metal.

The Type H has a wide field of application, being built in six sizes with capacities ranging from 8 tons hourly to  $\frac{7}{8}$ " ring, to 150 tons to  $4\frac{1}{2}$ " ring. Operators should acquaint themselves with this very efficient and economical crusher.

Ask our office nearest you for a copy of our Bulletin 105, covering this machine.

---

**TRAYLOR ENGINEERING & MANUFACTURING CO.**  
*ALLENTEWON, PENNSYLVANIA. U.S.A.*

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European Works—Usines Carels Freres, Ghent, Belgium

# *Cut* YOUR ROCK DRILLING COSTS IN 1937 WITH

## **TIMKEN** **ROCK BITS**

Every hole your drillers put down this year can be made to yield a substantial saving through the use of TIMKEN Bits.

Included in TIMKEN Rock Bit economies are (1) elimination of forging; (2) radical reduction in nipping costs; (3) greatly curtailed steel investment; (4) faster drilling; (5) increased footage yield per bit.

Wherever TIMKEN Bits have been given a thorough test against forged steel or other bits they have opened the eyes of drillers, who have been quick to realize their possibilities and take advantage of them.

Try them on your next job in comparison with the steel or bits you are now using, keeping an accurate record of their savings, and we are confident you will see the advisability of adopting them exclusively.



THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

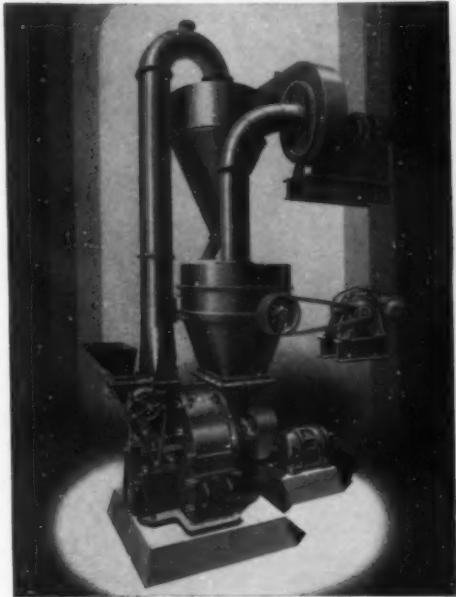
# **TIMKEN**

TRADE MARK REG. U. S. PAT. OFF.



# Serving the Rock Products Industry

## RAYMOND MILLS AND SEPARATORS

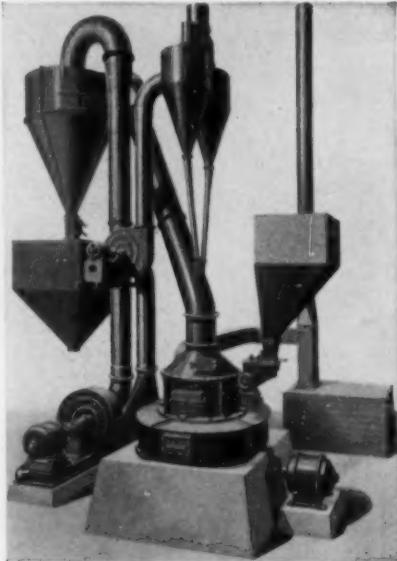


Whizzer Type Imp Mill with  
variable speed control on sepa-  
rator

RAYMOND engineers are constantly developing new types of equipment and advanced features of design to provide better and cheaper methods of producing powdered materials.

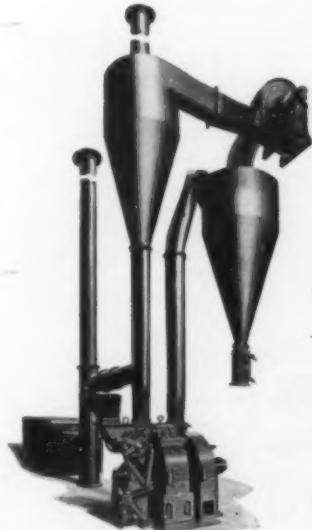
The Bowl Mill for direct-firing rotary kilns—the Flash Drying System for removing moisture while grinding—the Whizzer Separator built into roller mill or hammer type machines for giving wide range fineness control—these and many other developments are showing economies in production which may interest you.

Refer your pulverizing problems to Raymond engineers—fifty years' experience at your service.

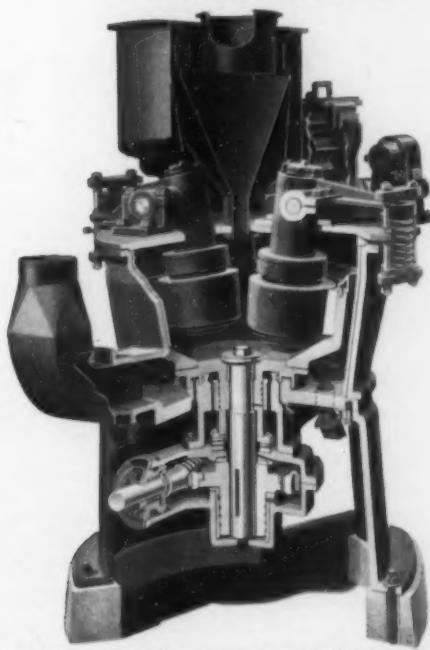


Roller Kiln Mill for drying and  
grinding in one operation

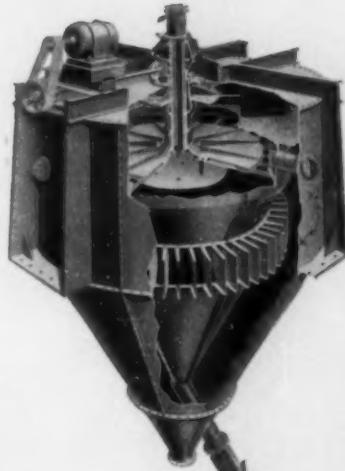
### BOWL MILL



Imp Kiln Mill for special grind-  
ing and drying operations



Bowl Mill direct-firing unit for rotary kilns, also used in  
closed circuit for grinding non-metallic minerals



Mechanical Air Separator with  
patented Whizzer

# RAYMOND

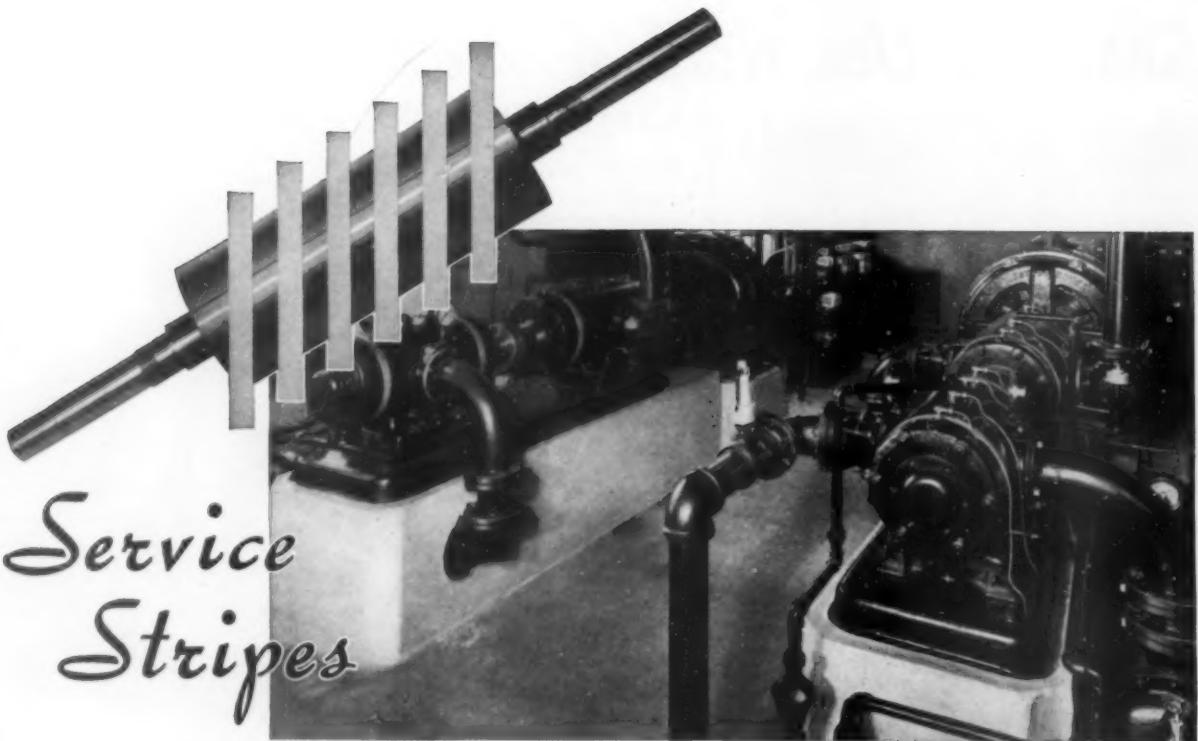
COMBUSTION ENGINEERING COMPANY, INC.

PULVERIZER DIVISION  
1307 North Branch Street, Chicago

Sales Offices in Principal Cities

CANADIAN REPRESENTATIVE:

COMBUSTION ENGINEERING CORPORATION, LTD., MONTREAL



*Service  
Stripes*

## for Two Fuller Rotary Compressors in their sixth year of front line duty without repairs or replacements.

TWO machines with a remarkable record . . . especially so, when you know they have been in service in a cement plant . . . about the toughest and most gruelling work a compressor can be subjected to. Day and night, for the past six years, these Fuller Rotary Compressors have hummed along doing their duty without a hitch. How does this check with the operation of your compressor equipment for a similar period?

There's really nothing unusual about some of the records being established by Fuller Rotary Compressors . . . hundreds of installations are in daily operation and giving perfect satisfaction. They're built to do this . . . for every dollar spent the customer receives value plus . . . every machine is built to give service over a long period of years at minimum expense.

For further detailed information write us for Bulletin C3-A

**FULLER COMPANY**  
CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.  
San Francisco: 390-321 Chancery Bldg.

C-18

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS	ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS	AUTOMATIC BATCH WEIGHERS BIN SIGNALS

# JAEGER'S *Increase Your Business!*

Demand for Jaeger ready-mixed concrete is "on the up" in Knoxville, Tenn. It's increasing in the East, the West, the North—convincing proof that the extra strength and workability of Jaeger concrete make it easier and more profitable to sell.

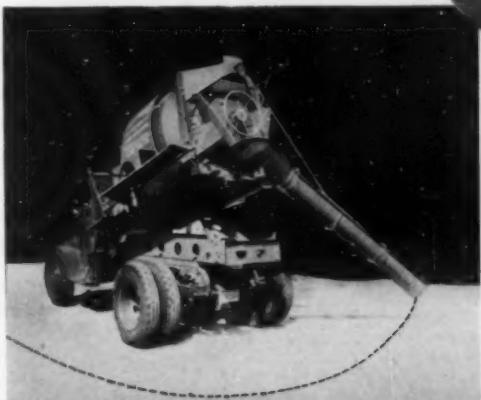
## Many Users Specify Jaeger **EXTRA STRENGTH Concrete**

Engineers and contractors recognize that Jaeger's Dual Mix Double - End - Cone Drum, with its exclusive method of mixing in mass and its smooth, continuous flow discharge, eliminates segregation and produces a higher strength concrete that is easier to work into forms. Jaeger operators recognize further advantages over their competitors in Jaeger's notably low cost of maintenance and use of lighter, stronger Man-Ten Alloy Steel construction, Two-Range Mixing Speeds and faster One-Man Swiveling Chute and Hopper—which are Jaeger originations. These Jaeger advantages will increase your business too. They mean more customers, more pay loads, lower costs, greater PROFIT for you—a combination which deserves your immediate attention. Write for full information.

THE JAEGER MACHINE COMPANY  
603 Dublin Ave., Columbus, Ohio



## • In KNOXVILLE

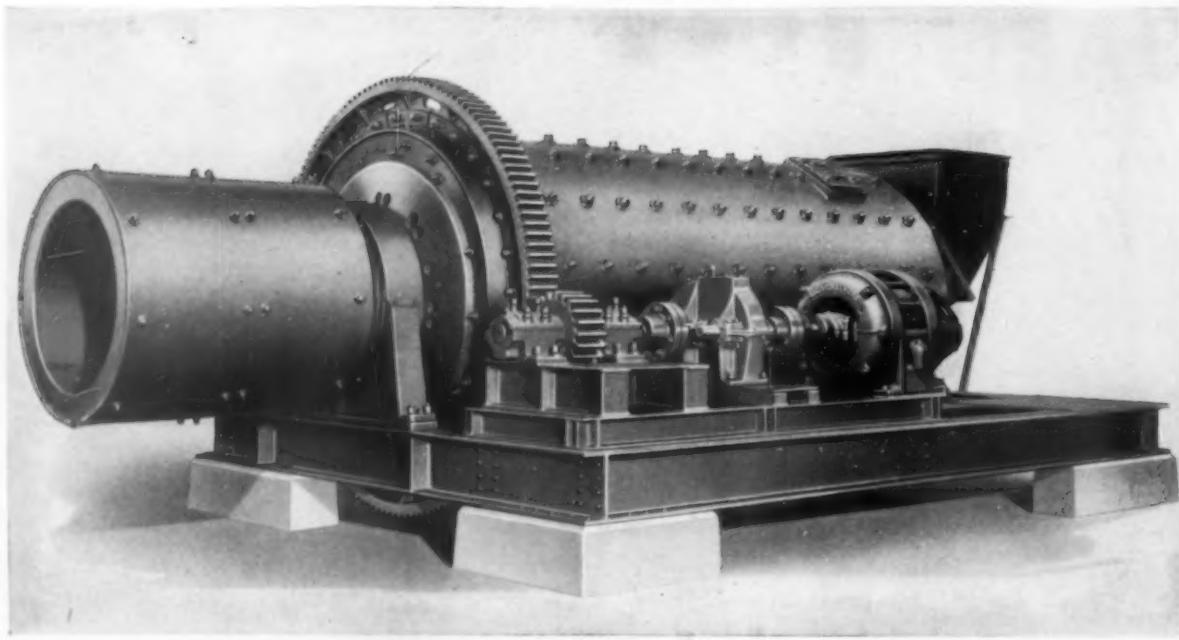


### KNOXVILLE SANGRAVEL MATERIAL CO., Knoxville, Tenn., Says:

"May, 1935 purchased two 1½ yd. Jaegers. Have since increased our fleet to 8. Well able to produce good quality concrete regardless of the design demanded. Loading can be executed in minimum time and discharge handled by truck driver, a 1½ yd. load being deposited in forms in approximately 3 minutes. During past 12 months have produced over 16,000 cu. yds., and maintenance cost has been almost negligible. Units are on 1½ ton Ford V-8 trucks. Compactness and well balanced load of Jaeger makes handling easy. Demand for our concrete seems to be increasing and we feel our mixers play a very important part." KNOXVILLE SANGRAVEL MATERIAL CO., Knoxville, Tennessee.

## JAEGER TRUCK MIXERS

1, 1½, 2, 3, 4, 5 CUBIC YARD SIZES



# A New and Better Machine for Washing and Scrubbing —



Inside of Blade Mill showing  
Adjustable Log Washer Teeth,  
and tangential variable depth  
discharge lifters.

After months of experimentation and research in their own laboratories and in the field Allis-Chalmers engineers have developed a new type of machine, the BLADE MILL, for washing, disintegrating, and cleaning ores, stone and other products containing a large amount of clay, slime, or other materials that are detrimental to subsequent processes of treatment. The inner periphery of this new mill is provided with a series of quick-removable, log washer type teeth arranged for angular adjustment on special bases to which the teeth are attached. The disintegration is effected by combined cutting and rolling action in water within the mill, using a relatively deep bed.

It has a much wider application than the conventional log washer, as it can handle material up to 12 inches or larger in size. The mill is arranged for variable speed and variable pulp level. The combination of angular adjustment of blades, with variable depth of bed and speed, provides unusual flexibility. It has a wide range of adaptability both for the treatment of ores and in the aggregates industry.

EQUIPMENT ENGINEERS TO INDUSTRY

**ALLIS-CHALMERS**

MILWAUKEE WISCONSIN



★ The Lorain-40 carries a full, honest-measure  $\frac{1}{4}$  yd. dipper, yet in weight and price it approximates most  $\frac{1}{2}$  yd. machines. Its 50% increased capacity for so little additional investment, plus the fact that it is an efficient, all-purpose unit of 101 cost-cutting, production-speeding uses, explains why it has been so readily accepted in quarries and sand and gravel plants... They use them **for clean-up work**, where a big shovel is inefficient, slow, expensive... **for stripping**, replacing the usual cast-off shovel; the investment is no greater, the results are better... **For stock piling**, material handling, truck loading, bin charging, etc.... **For digging**, as a shovel or dragline, to meet steady production demands; to "pinch hit" for larger shovels in emergencies, to help meet schedules.

THE UNIVERSAL CRANE CO., LORAIN, OHIO

LORAINS

MOVE MORE MATERIAL, FASTER AT LOWER COST



CU.  
3/8 to 2  
YD.

# *For Uniform Grinding...*

## **USE THESE *Uniform* GRINDING BALLS**



EVERY ball exactly like its "brother" — that's what you want in grinding balls. And that's what you get in forged balls made by the Lorain Division.

Uniformity starts with the ore and follows through every step of the steel-making, right up to where the bars are heated and forged into solid

spheres of homogeneous steel. Heat treatment and finishing carry this improvement forward to give you the toughest grinding balls available.

For cement and other grinding you can get Lorain Grinding Balls in these diameters —  $\frac{1}{2}$ ",  $\frac{5}{8}$ ",  $\frac{3}{4}$ ",  $\frac{7}{8}$ ", 1",  $1\frac{1}{4}$ ",  $1\frac{1}{2}$ ", 2",  $2\frac{1}{2}$ ", 3",  $3\frac{1}{2}$ ", 4",  $4\frac{1}{2}$ " and 5".

### **OTHER LORAIN PRODUCTS**

Mill Liners and Screens of Manganese, Chrome Nickel and plain Carbon Steel or Hard Iron; Hammers for Swing Hammer Mills; Industrial Cars and Trackwork.

**CARNEGIE-ILLINOIS STEEL CORPORATION**

*Lorain Division*

Columbia Steel Company, San Francisco, Pacific Coast Distributors



*Johnstown, Pa.*

United States Steel Products Company, New York, Export Distributors

**UNITED STATES STEEL**



In the custom mill of the Cripple Creek Mining and Milling Co. of Cripple Creek, Colorado, this 48 in. Telsmith Gyrasphere Crusher is in closed circuit with a vibrating screen, all ore being crushed to minus  $\frac{3}{8}$ " before going to the roaster.

## *Crushing the Ore FROM 30 MINES . . .*

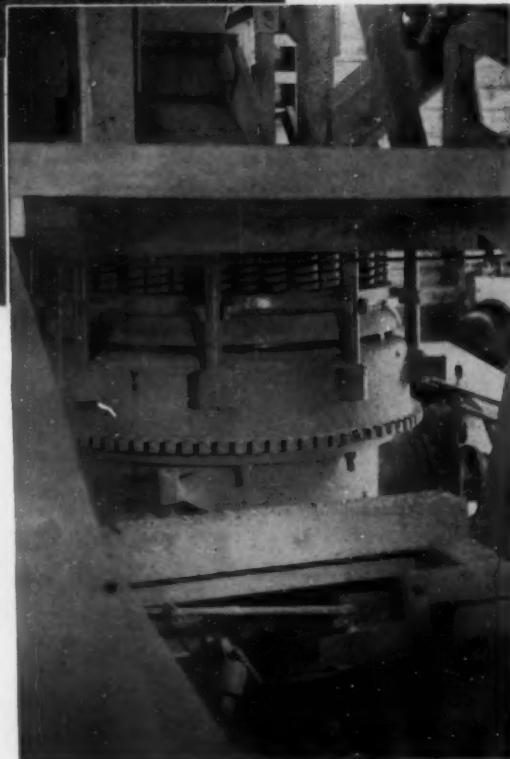
Like all other Telsmith Crushers, this 48-in. Telsmith Gyrasphere takes its rock as it finds it . . . hard, harder, or hardest . . . turns out a finer, more cubical product . . . and a lot more of it . . . in faster time . . . with less trouble, less power and less up-keep.

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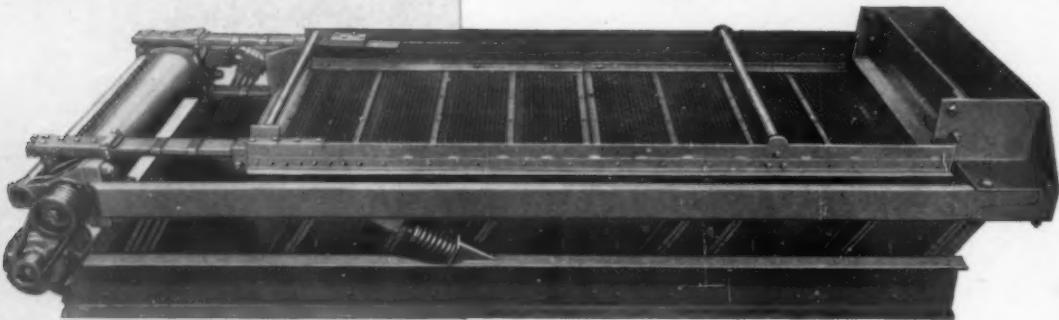
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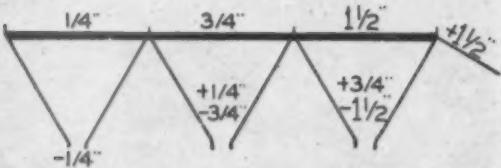
# TELSMITH CRUSHERS

VC-10-B

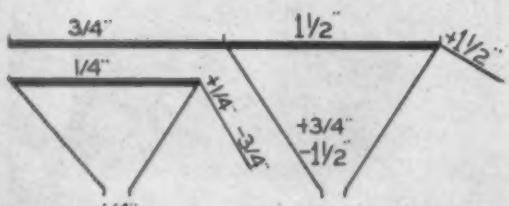
# Only a Flat SYMONS SCREEN offers so many screening combinations



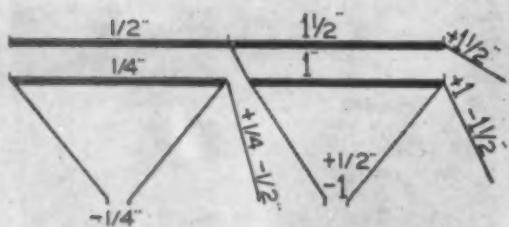
## Three of the many unusual Symons Screen arrangements



Long single deck screen giving three screened sizes and an oversize where this type of screen is preferred.



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If you are interested in better screening and are considering changes in your screening equipment, see what Nordberg has to offer in the Symons Screen.

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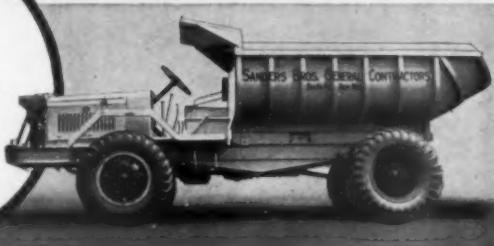
Write today for complete information and let our engineers show you how Hug can meet your hauling requirements and reduce your hauling costs.

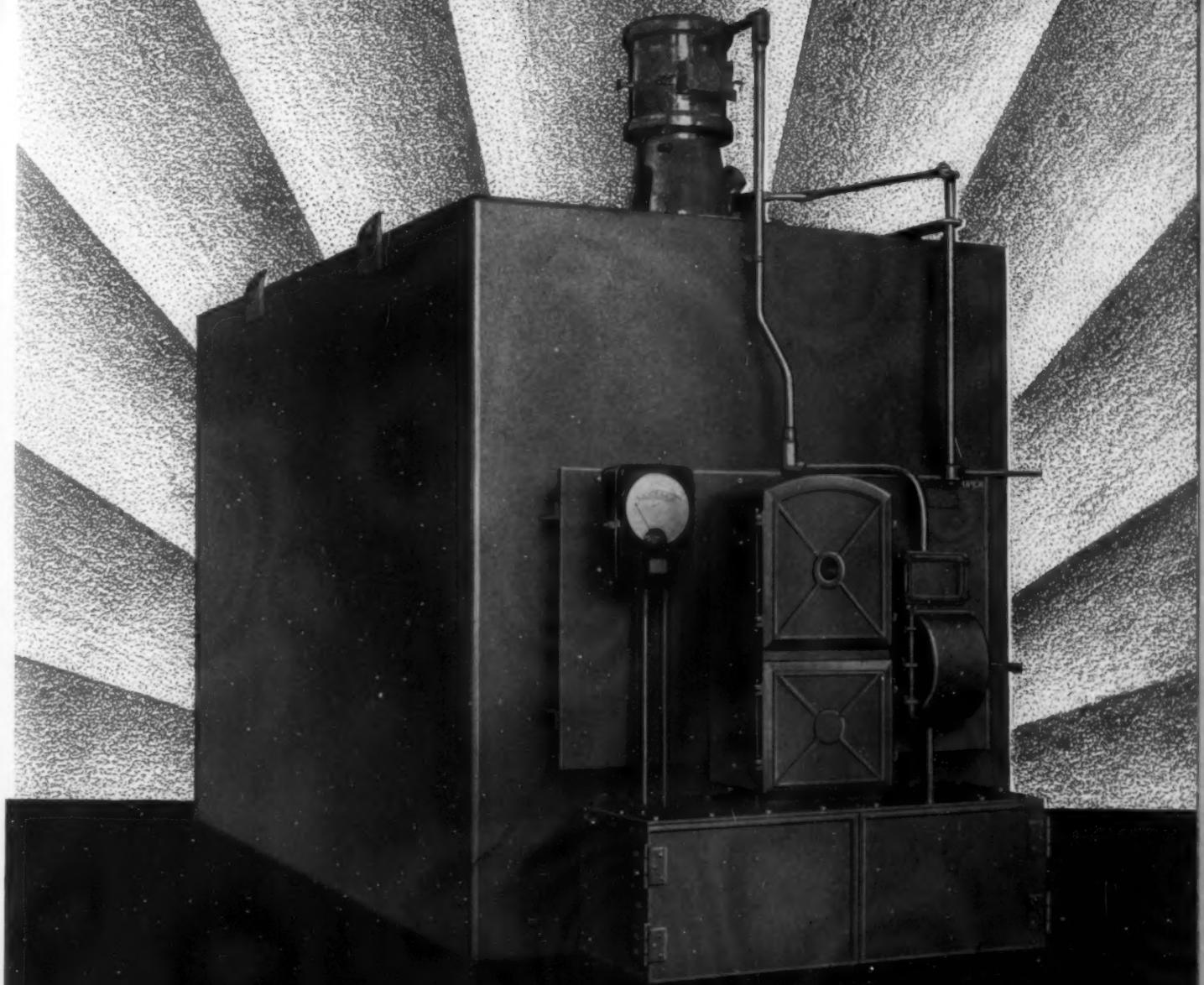
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● At left: Model 87K Hug Roadbuilder with Hug 5-yard Excavation type body.

● At right: Model 87Q with standard 6-yard Hug Scoop-End body, U-shaped "I" beam side braces and equipped with high dumping angle power hoist.





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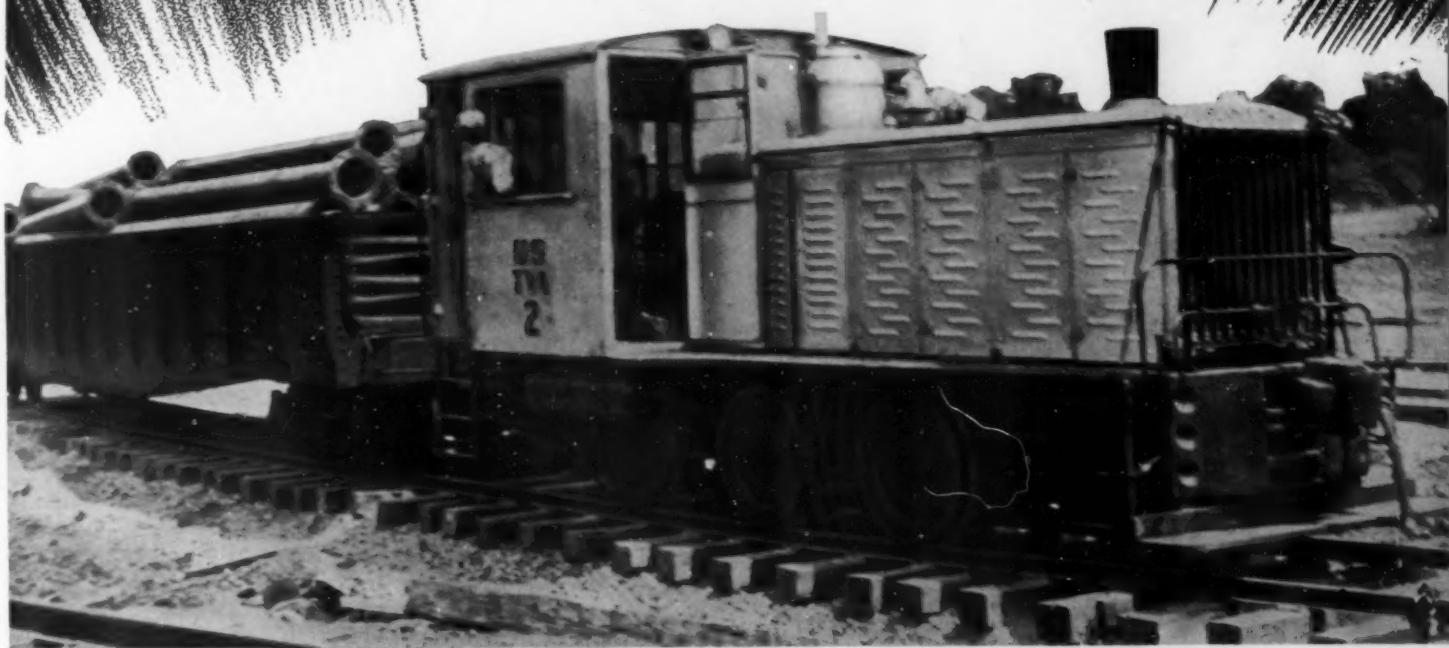
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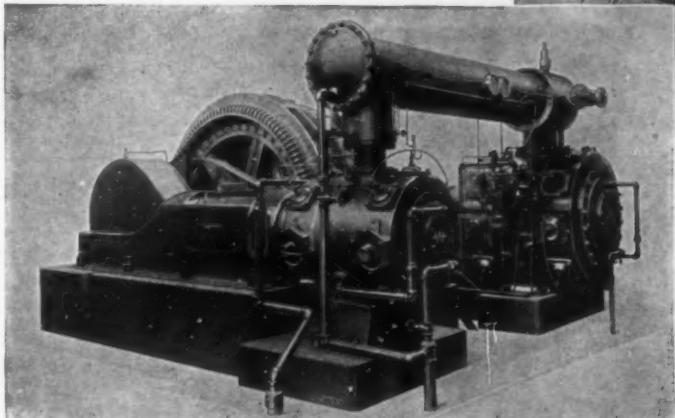
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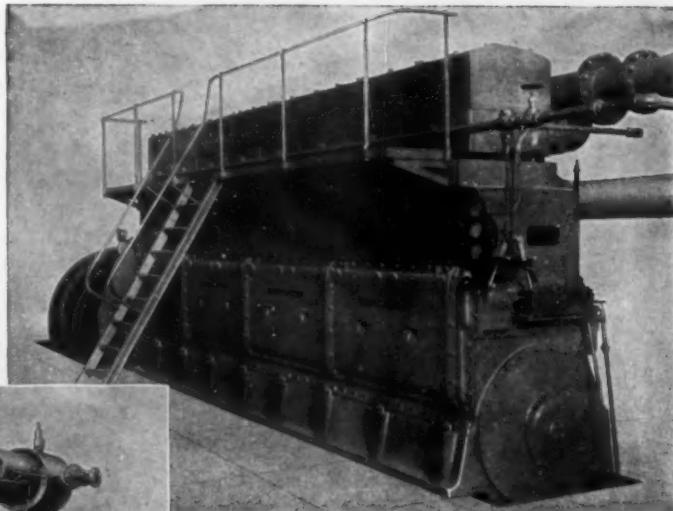
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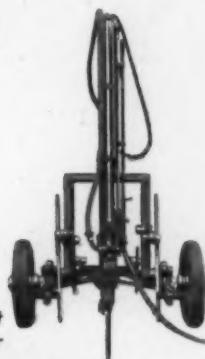
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The cover of this idler folder is a reproduction of the front cover of an issue of Fortune magazine, featuring the largest hard-rock plant in the world, completely equipped with Rex-Stearns Idlers.

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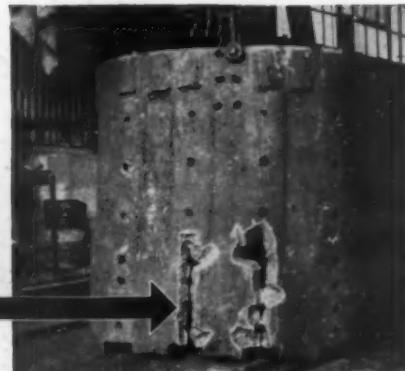
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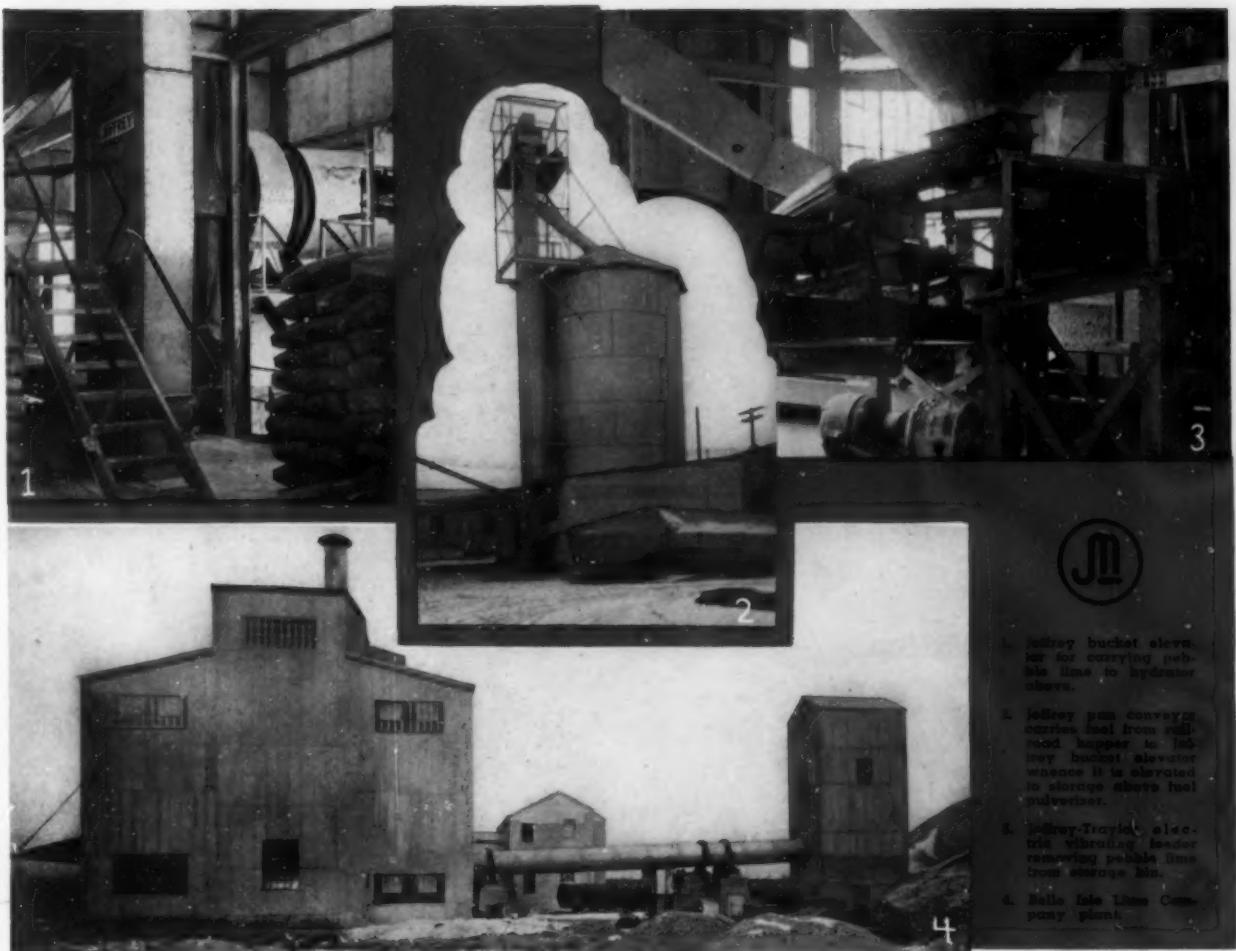
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Jeffrey bucket elevator for carrying public lime to hydrator above.

2. Jeffrey gun conveyor carries fuel from railroad hopper to Jeffrey bucket elevator whence it is elevated to storage above fuel pulverizer.

3. Jeffrey-Traylor electric vibrating feeder removing pebble lime from storage bin.

4. Belle Isle Lime Company plant.

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Feeding of stone to the kiln is controlled by one of these feeders . . . lime is removed from the cooler by another . . . a third regulates the flow of fuel into the pulverizing mill . . . while the fourth accurately regulates the flow of pebble quicklime from the main storage

bin to a pulverizer or to railroad cars, or to the hydrating plant, at any rate up to 15 tons per hour.

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THIS is one of the Cordeau features that have made the giant blast not only possible but highly profitable. The Inland Lime and Stone Company has found this to be the case—in fact they are credited with some of the largest blasts on record.

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The shoes used on these tractor-type crawlers are made of tough alloy rolled steel, heat-treated for extra strength. They're uniformly strong throughout—no hidden flaws—no weak spots. Designed with hinge action, they overlap each other. Stones can't get between. There's no clogging . . . no breakage . . . no loss of tractive power. They're renewable—interchangeable. You simply remove four bolts to lift out any shoe without disturbing the crawler track. It's no exaggeration to say that these P&H excavators with tractor-type crawlers will travel faster and farther with less trouble than any other machines. It's another feature that makes P&H Pacemakers faster on the job.



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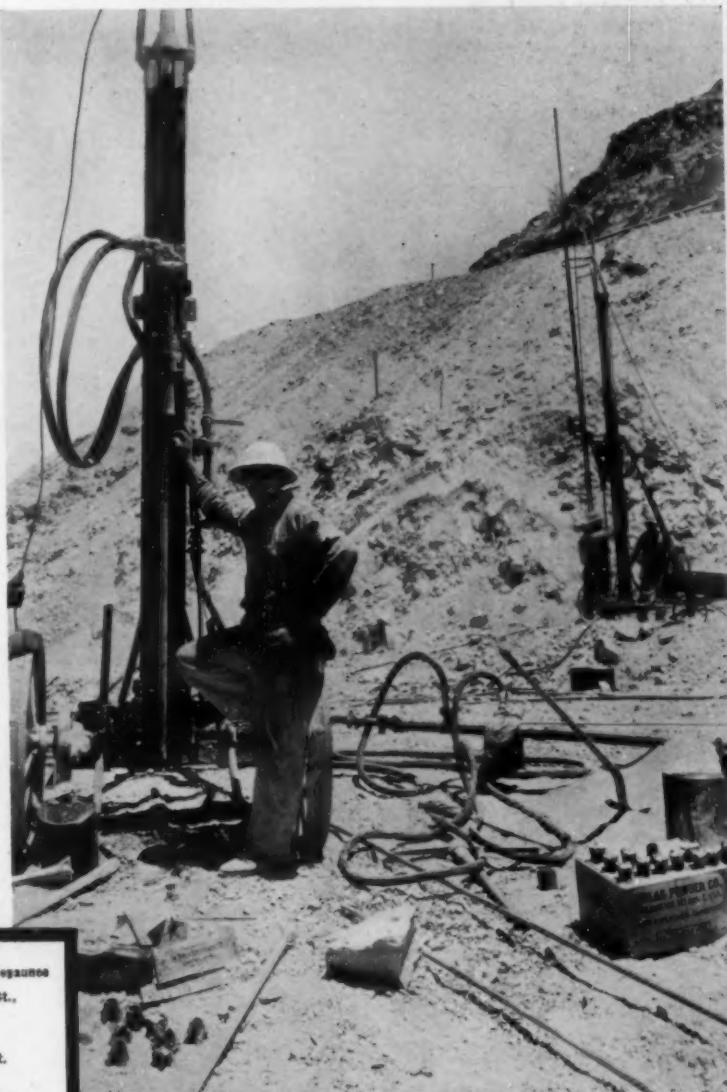
C O R P O R A T I O N



# 6 OUT OF 7 WAGON DRILLS ON THE ALL AMERICAN CANAL ARE *Clevelands*

**I**N the rock cuts along the All American, six out of seven wagon drills are Clevelands. Selected because they drill faster, blow the holes better, and are so much more adaptable and so much easier to handle, Cleveland Drill Rigs have had an important part in excavating this big ditch that will furnish water for irrigating a million acres of fertile soil in the Imperial and Coachella Valleys of California.

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The cut in which this picture was taken necessitated the removal of nearly 600,000 cubic yards of hard rock. Two Cleveland Drill Rigs did all the primary drilling.

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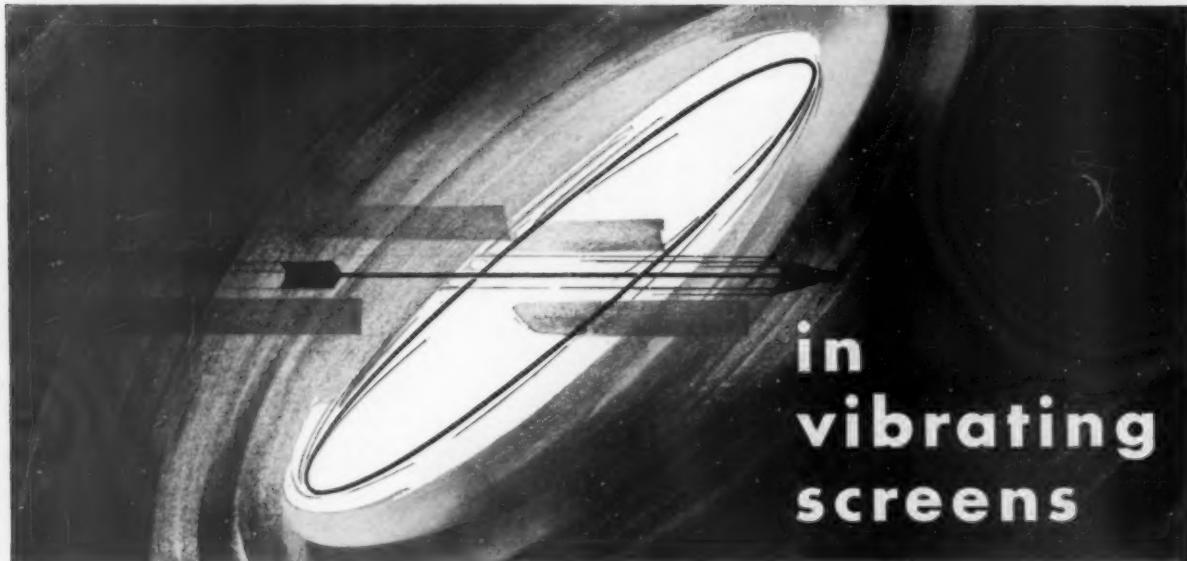
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R.P.

# .Rock Products

Volume 40

Chicago, February, 1937

No. 2

## AT LEAST 60 PERCENT ARE PRO-JOB!

**I**N THIS COUNTRY there are no fundamental class issues involved in labor disputes, as some political and labor leaders, for obvious reasons, and some trade papers, for less obvious reasons, would have us believe. His own travels and intimate acquaintance with the rock products industry had long ago convinced Rock Products' editor of this, but it was pleasant to have his conviction confirmed by no less an authority than Whiting Williams, well-known writer, lecturer and all-around expert on labor, in his address "What's on the Worker's Mind Today," at the recent Cincinnati Convention of the National Crushed Stone Association.

It is very unfortunate for employers to get the impression that there exists a national labor issue, said Mr. Williams, because it leads them to think that labor trouble, so far as they are personally concerned, is a matter of chance. The editor has found few in the rock products industry who he knows give this matter serious thought, who believe differently from Mr. Williams on that point. For these men had already expressed the same view as that of Mr. Williams, namely, that where labor trouble starts, it is local and due to some one employer's neglect of his workers' grievances.

As Rock Products has often emphasized, in the majority of instances in this industry, with numerous small operations and owner management, there is less opportunity for unadjusted workers' grievances than is the case with great corporations, where the foreman is usually the only representative of the management the average employe ever gets to. The rock products industry therefore offers less opportunity for what Mr. Williams described as "managerial stall-it-us"—being

the well-known tendency of hired managers to stall off meeting issues as long as possible.

Practically all of us are workers—producers in some degree—and one's attitude towards his work does not change essentially as you go up or down the ladder of responsibility. All normal persons take pride in having jobs and in being self-supporting, and nearly all take pride in the products of their work, if given an opportunity to do so. Hence, as Mr. Williams said, at least 60% of the employees of any organization are always *pro-job*. A relatively small percent may be *pro-union*, and the rest are described as *pro-company*.

No labor leader or agitator can conduct a successful strike without obtaining the active or passive coöperation of a majority of the 60% *pro-job* employes, who may or may not like their employers, but do like their jobs. That coöperation is never obtained unless these 60% *pro-job* employes are nursing some unadjusted grievance or grievances, of which the management may be, but should not be, unaware.

Elimination of unfairness, such as favoritism by superintendent or foreman, elimination so far as possible of the fear of losing one's job through no fault of one's self, inspiration of hope and instillation of pride in the job and in one's work—the increase of one's self-respect—and preservation of wage differentials between skilled and unskilled workmen are important essentials to healthful labor relations, according to Mr. Williams.

Here, then, is one place where the Golden Rule, "Do unto others as you would have them do unto you," can be applied with profit to all concerned. Human relations are fully as important to business success as balance sheets.



Courtesy of the Chicago Journal of Commerce

## Cement Industry in Mexico During 1936

PRODUCTION AND SHIPMENTS of cement in Mexico reached an all time record during the year 1936 notwithstanding several general strikes in the oil industries, upon which the several companies rely for fuel, and a series of strikes in the electrical industries, upon which the majority of the cement companies rely for power. As a result of a federal law passed during the early part of the year, whereby workmen must receive seven days of salary each week for only six days of work, all cement producers were affected by a 16.6% increase in wages. Additional federal and state laws fixing a minimum wage scale in each of the states, plus increased wages due to new collective contracts had with the labor unions at individual plants, further increased the wage scale and resulted in an average increase in labor costs of about 25%.

The increase in cement shipments was largely due to Federal Government expenditures in road building, the construction of large dams and irrigation systems, workmen's colonies, and to individual state expenditures for street paving and waterworks systems. The increased interest in mining centers due to the increase in value of copper, lead, silver, gold, etc., and the opening up of new mines and enlarging of existing ones, contributed somewhat to the increase in the demand for cement, as did increased activities in the oil fields, the construction of several new railroads and the like. There was a lull in private construction during the latter part of the year, made so due to a new federal expropriation law which permits the government to expropriate public or private businesses for "public utility," paying the owner or owners of expropriated properties and industries in Mexican Government bonds payable over a period of ten years. The general feeling that the Federal Government will go slow in exercising its rights under the expropriation law resulted in a renewal of private building towards the year end.

With the official opening of the Mexico City-Laredo highway during the middle part of the year, and the influx of tourists via automobile, rail and air routes, the prosperity of Mexico has been greatly enhanced, and in order to accommodate the thousands of tourists that are visiting all parts of Mexico, a great number of hotels, tourist camps, restaurants, filling stations, etc., must be built, and a number of these are already under construction. Points of historical, scenic and climatic interest not heretofore reached with ease, are now being opened up to the tourist

traffic through the construction of innumerable roads, mostly of the asphalt construction type, but the majority of bridges and culverts are being made of concrete, as are mileposts and guard rails, etc.

During the year Cementos de Mixcoac, S. A., with plant at Mexico City, completed the installation of a coal grinding and burning unit, and the operation of its kiln alternates between the use of fuel oil and coal and it has utilized the two simultaneously.

Cementos Atoyac, S. A., with plant at Puebla, installed two tubemills and additional processing equipment for the increased demand that has been had for the new processed cements being produced at that factory, and plans are under way for the further installation of equipment during the year 1937.

Cia. Manufactura de Cemento Cruz Azul, with plant at Jasso, Hidalgo, and operated by a "cooperative society of workmen," installed a Compeb mill during the year.

Cia. de Cemento "Apasco," with site at Apasco, Hidalgo, for which complete cement and hydroelectric machinery was purchased in Germany and Sweden during the year 1930, acquired a loan of \$250,000, Mexican currency, from one of the Mexican Government loan banks during the year and started installation of machinery which it is claimed will be ready for operation by the latter part of June, 1937.

Cementos Mexicanos, S.A., with plant at Monterrey, Nueva Leon, operated during the year at near capacity as did the plant of "La Tolteca," Cia. de Cemento Portland, S.A., located at Tolteca, Hidalgo.

The small cement plant located at Hermosillo, Sonora, did not operate during the year, but made small shipments from stock to limited construction work carried on in its territory. Rumors have subsided to the effect that American capital may come further into this company, and the plant moved to the more suitable site at Mazatlan, Sinaloa.

The proposal that government loans be made to place in operation the plant of Cemento Hidalgo, situated at Hidalgo, Nueva Leon, and that the plant be placed in the hands of the workmen for operation upon a cooperative basis, has thus far not been acted on.

With further Federal and state budgets for roadbuilding and public works already approved, and with increased activities in the industrial field as a whole, the year 1937 should prove another recordmaking one in the cement industry of Mexico.

## Alleges Black Listing

FLORIDA PORTLAND CEMENT Co., Tampa, Fla., Frank M. Traynor, vice-president, was a witness before Federal Trade Commission representatives at Tampa, investigating the activities of the Florida Building Material Institute, which is charged with attempting to monopolize the builders' supply business of Florida. According to local newspapers, Mr. Traynor testified regarding alleged "black listing" of his firm because it was not a member of the institute. He introduced sales records of his company in an effort to show the firm lost business during the period when the institute's activity was at its height.

## Bonus Payments

CALAVERAS CEMENT Co., San Francisco, Calif., gave its plant employes who had had six months or more service a year-end bonus of \$50. Salaried employes who had served 12 months or longer received one-half a month's pay extra.

COLORADO PORTLAND CEMENT Co., Denver, Colo., paid year-end bonuses of 10% of the annual earnings of plant employes.

PENNSYLVANIA - DIXIE CEMENT CORP., New York City, is reported to have paid a "wage dividend" of approximately 2% of annual earnings to plant employes, near the end of December.

MARQUETTE CEMENT MANUFACTURING Co., Chicago, Ill., paid year-end bonuses to all plant employes—a minimum of \$25 for those employed less than a year and a minimum of \$50 for those employed more than a year.

LEHIGH PORTLAND CEMENT Co., Allentown, Penn., paid a year-end bonus to employes, about Christmas time, with minimums of \$25 and \$50 for those employed under and over one year.

ALPHA PORTLAND CEMENT Co., Easton, Penn., was reported to have paid bonuses averaging about \$25 to employes of its Birmingham, Ala., plant. Similar bonuses were probably paid at other plants of the company.

OKLAHOMA PORTLAND CEMENT Co., Ada, Okla., and its subsidiary, Ideal Dry Ice Co., paid year-end bonuses equivalent to 10% of each employe's annual earnings.

ASH GROVE LIME AND PORTLAND CEMENT Co., Kansas City, Mo., distributed bonus checks to employes, late in December, approximating two weeks' pay.

# DETROIT'S NEW ROTARY KILN LIME PLANT

## Belle Isle Lime Co. Has Some Novel Features

By Bror Nordberg

THE PLANT of Belle Isle Lime Co., recently completed in Detroit, Mich., features several innovations in the firing of its rotary kiln, designed for high production and a high lime-fuel ratio.

The office and plant are located at 95 South St. Jean Ave., within the limits of the city, opposite Belle Isle in the Detroit river. Limestone is shipped to the plant, and the finished product is made in a consumer market.

Stone is transported to the plant in 5000- to 10,000-ton self-unloaders of the Morrow Steamship Co. from the quarry of the Inland Lime and Stone Co., Port Inland, Mich. Stone used in the manufacture of lime is one of the highest in calcium carbonate obtainable on the Great Lakes. It is crushed and screened to  $\frac{5}{8} \times 1\frac{1}{4}$  in. and is washed before loading, and again when unloaded from the boats.

Stone is stored near the company's wharf in a large pile about 50 ft. high, and is recovered from stockpile by an 18-in. belt conveyor traveling in a tunnel below. It is only when the stock of stone becomes low that a crane is required to throw the edges of the pile to a point over the tunnel.

Sufficient stone is stockpiled during the summer and fall months to provide for continuous plant operation during the winter months.

### Stone Preheated

The tunnel under the stockpile is 6 ft. 3 in. in diameter by 112 ft. long, of steel and concrete construction. Stone flows on to the 18-in. belt conveyor through any of seven gates in the top of the tunnel. The slope of the gate chutes controls the stone feed. The belt conveyor discharges to the foot of a 60-ft. Jeffrey elevator, carrying the stone to a 10-ton hopper in the top of the stone house.

The average rotary-kiln lime plant introduces cold stone direct to the kilns, where it is heated and burned in one operation, requiring a travel of 75 to 80% of the length of the kiln to approach the calcining temperature. Here a preheater was designed and installed in the stone house to use heated kiln gases to raise the temperature of the stone to the point where almost the entire kiln can be effective as a zone of calcination.

Stone feeds by gravity from the 10-

ton hopper in the stone house into the preheater, which is a 6 ft. in diameter by 7 ft. high vertical stack. The preheater is directly above the feed end of the kiln. A Sirocco fan, above the preheater, draws kiln gases from the kiln through the preheater. The stone and gas travels are counter-current, providing a maximum heat exchange. In passing through a 2-ft. bed of stone, the gas temperatures are reduced from 1500 deg. to 350 deg. The preheater is designed to heat 100 tons of stone to 1000 deg. F. in 24 hours. The temperature of stone entering the kiln varies but little as the kiln load is changed.

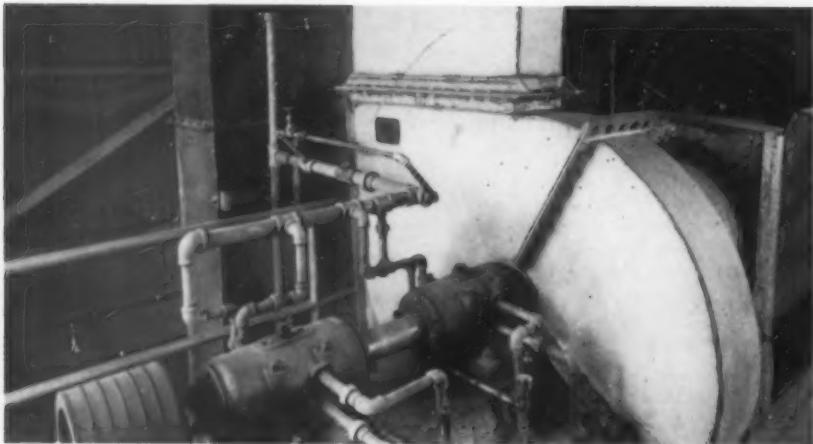
### Kiln Feeder Insures Constant Load

A constant feed from the preheater to the kiln is maintained by the kiln operator through the use of a Jeffrey vibrating feeder. The preheater discharge is raised by a 25-ft. centers Jeffrey bucket elevator to the kiln through a pipe.

A 6- x 100-ft. Vulcan Iron Works rotary kiln is now in operation and a second one, 8 x 100 ft., will be started some time this year. The present kiln is in the open throughout its length. It is



Pebble quicklime is stored in the 170-ton bin. Lime from the discharge end of the kiln on the right falls into a soaking chamber below.



*Heated air from the kiln is pulled counter-current through the incoming stone in the preheater by this fan*



*Combustion air, both primary and secondary, is forced by this fan through the bed of lime in the cooler to the right*



*The flow of pebble quicklime from storage to the two-way shuttle conveyor is regulated by the vibrating feeder in the center*

lined with 6-in. General Refractories 70% alumina brick through most of its length and is insulated throughout with Armstrong A25 insulating brick. This is probably the first case where a rotary kiln has been insulated throughout.

The lime drops from the kiln into a Warner soaking chamber, to which a cooler has been added. The soaking chamber is intended to utilize the sensible heat of the lime (above 1700 deg.) to remove any core remaining in it, and to assure a greater uniformity in quality by providing plenty of time to allow the temperature to become uniform through every particle. The soaking chamber has a capacity of several hours' output of lime.

Lime descends from the soaking pit into a stationary cooler. All combustion air, both primary and secondary, is forced by a Buffalo fan up through the bed of lime in the cooler. The soaking and cooling chambers are completely lined and insulated, so that all heat can be recovered and returned to the system, with the exception of that escaping in the sensible heat of the lime (300 deg.) leaving the cooler. As operating conditions are improved, this escaping heat will be somewhat reduced in temperature. Lime is removed from the cooler by a Jeffrey mixed current vibrating feeder and is raised to a 170-ton capacity quicklime storage bin by an 80-ft. centers Jeffrey bucket elevator.

#### Pulverized Coke Fuel

A petroleum coke, bought from the White Star refining plant at Trenton, Mich., is used to fire the kiln. This fuel, according to the operators, is proving itself to be well suited to the burning of lime for sale to the chemical trades. It has a heating value of over 16,000 B.t.u. and contains less than  $\frac{1}{2}$  of 1% ash and is low in sulphur.

The fuel is received by railway and unloaded through a track hopper to a Jeffrey pan conveyor. The pan conveyor discharge is raised by a Jeffrey bucket elevator to a 19-ft. diameter by 25-ft. high steel bin directly above the fuel pulverizer. A Jeffrey vibrating feeder delivers the fuel from the bottom of the storage bin into an air-swept Raymond Imp mill equipped with a No. 6 blower on the same shaft with the mill. Fuel is pulverized to 96% through 200-mesh in the mill.

The pulverizer receives hot air from the lime cooler and discharges the mixture of fuel and hot primary air through the 7-in. diameter kiln burner into the kiln. The heated air is split, with about 25% of the combustion air passing through the pulverizer to the burner. The secondary air has a temperature of 600 deg. or more and the primary air enters the kiln at about 200

deg. Secondary air enters the kiln around the burner.

#### High Efficiency

The preheating of stone, the heating of all combustion air and the insulation of the kiln throughout its length have combined for high efficiency and production. Due to the high preheat of stone, it has been found necessary to operate the kiln at a higher speed than normal, and to carry a much heavier kiln load than is usual. The low temperature of the gases leaving the pre-heater (350 deg.) is indicative of the high kiln efficiency.

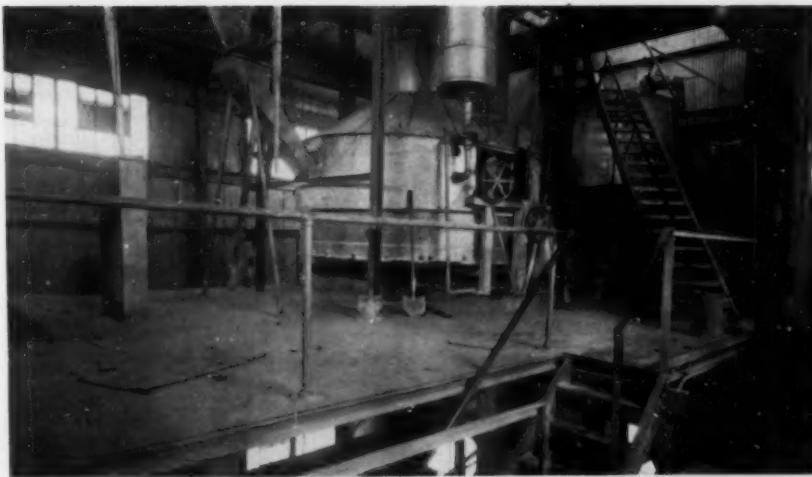
The kiln has the standard pitch of 1 in 20, and is turned by a 15-hp., slipping motor through a Ganschow gear reducer. The firing details are designed for an ultimate capacity of 100 tons of lime per day, where ordinarily the output would be limited to about 40 tons per day. In the first month of operation, in excess of 60 tons per day had already been produced. The kiln turns at 1 r.p.m. Stone requires about 45 minutes in the kiln to be converted into lime.

The entire control of the kiln is in the hands of a single operator on the firing floor. He regulates very accurately by rheostat the movement of stone through the preheater and into the kiln, controls the flow of fuel into the pulverizer by a similar rheostat and uses a third one to regulate the movement of lime through the cooler. All equipment is driven by individual motors, controlled by push buttons or rheostats from the firing floor. There are a number of Jones gear reducers in use and a number of V-belt drives, with almost the entire elimination of ordinary belt drives. The control system is being extended to make it as fully automatic as possible.

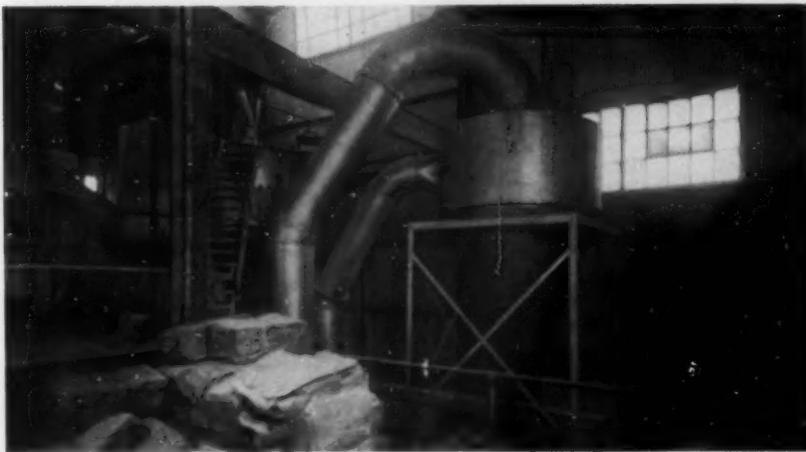
#### Shipping Facilities

To return to the quicklime storage tank, lime can be drawn to go any one of three ways. Lime is removed from the bin at any rate from 0 to 15 tons per hour by a Jeffrey mixed current vibrating feeder on the bottom of the bin. Lime can go in bulk direct to the cars or it may go to the quicklime pulverizing plant or to the hydrating plant.

Lime is discharged from the vibrating feeder to a 16-in. shuttle belt conveyor, traveling in either direction, on 12-ft. centers. When operating in one direction, this conveyor furnishes pebble lime to a No. 0 Sturtevant hammer-mill pulverizer. Pulverized lime from this hammer mill is elevated by a Jeffrey elevator into a 12-ton storage bin. Lime feeds by gravity from this bin to a Bates valve bagger and is placed in 50-lb. multi-wall paper bags.



Lime is passed from the bin above to this hydrator in 1600-lb. batches. Hydrate is then put through an air separator



Hydrate fines are collected in the cyclone. Storage and the bagging machine are directly below. The air separator is on the left



Oversize from the 10-ft. air separator is passed through the automatic throw-out pulverizer on the right, where rejects are removed

When the shuttle conveyor travels in the opposite direction, it discharges to a 16-in. belt conveyor, 78-ft. centers, which also travels in two directions. When running in one direction, pebble lime discharges into a box car located on a Strait track scale. In the box car, a belt "kicker" throws the lime to the ends of the car.

The conveyor belt runs in the opposite direction to supply the hydrating plant. From the end of the conveyor, lime is elevated by a Jeffrey elevator to an overhead 10-ton hopper above the Clyde hydrator. Lime passes from this bin to a weigh hopper and to the Clyde hydrator, in 1600-lb. batches. Water for the Clyde hydrator is measured by volume. From the hydrator, the lime passes through a feeder into a 10-ft. Raymond air separator closed-circuited with a Raymond automatic throwout pulverizer. The fines (99.5% through 300-mesh) pass by screw conveyor from the separator to the hydrate bin. A Bates bagger takes care of the bagging of chemical and mason's hydrate.

The belt conveyor that handles the pebble lime from the large storage bin to the cars is also used to convey pulverized quicklime from the pulverized lime bin to cars, and to carry bags from the baggers to cars. A home-made bagger is used to measure and bag pebble lime in open-top bags.

Stone enters at the east end of the company's property, where it is unloaded from the boat, and travels during the processing to the west end, where the finished product leaves by truck or rail.

Products sold are pebble and pulverized quicklime, high calcium chemical hydrate, mason's hydrate and mortar cement in bulk, paper sacks or 180-lb. drums. About one half of the plant output is sold to the building trade and the other half to the chemical industries.

The officers are G. J. Nicholson, president and treasurer; T. C. Taylor, vice-president and general manager; C. A. Campbell, vice-president; G. M. Nicholson, secretary and counsel. M. H. McGaffigan is superintendent and J. W. Stockett, Jr., is chemical technician.

### New Job

BEAVER PORTLAND CEMENT CO., Portland, Ore., president, Dewey L. Carpenter, resigned January 1, to devote his entire time to the Ross Island Sand and Gravel Co., Portland, of which he is also president.

### Fatal Accident

MEDUSA PORTLAND CEMENT CO., Silica, Ohio, plant suffered a fatal accident to a quarry employee on December 16, when a compressed-air pipe exploded.

### Continuous Rebuilding

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., is continuing improvements at its Cape Girardeau, Mo., plant, begun in 1936. A part of the rehabilitation scheme is to have a plant that can operate continuously and efficiently at 50% capacity, if necessary, instead of operating intermittently at near full capacity. In 1936 a new, very tall, reinforced-concrete stack was completed. Also washing equipment for limestone, which provides clean commercial crushed stone as well as cement raw material whose analysis can be kept fairly constant. Additions were made to the river transportation fleet, which now consists of 20 barges and 2 tow-boats. Improvements to be made in 1937 include a revamping of the raw grinding department, particularly to provide greater flexibility in operation and control of various mixtures for different kinds of cement.

### Banquet and Bonus

BEST BROS. KEENE'S CEMENT CO., Medicine Lodge, Kan., treated all its employees to a turkey dinner on December 28, after which the employees to the number of about 100 were given bonus checks. Clifford Histed, general manager, was host. John C. Best, president, was unable to be present because of illness. Local newspapers reported Mr. Histed as having said that 1936 had been a good business year, as compared with 1935, but the money taken in had gone into payrolls, taxes, equipment and improvements, both at the plant and at the mines. Considerable money had also gone into reducing the bonded indebtedness. No dividends had been paid to stockholders during the year, Mr. Histed stated, as the stockholders preferred that the money should go back into the company, giving it additional strength in every department.

In speaking about the hopes for the future of the company he reminded his hearers that the principal products of the company are and have been Keene's cement, paper filler and plaster. There are opportunities to expand, he said, into lines peculiarly adapted to the product of the local mills, such as for mixing into paint pigments, linoleum manufacture and the rubber industry, as well as for making pottery molds.

### Lightweight Aggregates to Persia

PACIFIC PORTLAND CEMENT CO., San Francisco, Calif., recently shipped 300 cu. yd. of its lightweight burned-clay aggregate to the Bahrein Petroleum Co., Bahrein, Persia, for refractory lining of furnaces.

### New Process Cement Exclusively

CEMENTOS ATOYAC, S. A., Puebla, Mexico, announces the appointment of Luis Gambos as superintendent. Other officials of the company are F. J. Miller, president; Alton J. Blank, general superintendent and supervising chemist; W. B. Williams, chief engineer; J. A. Blank, consulting chemist; E. Linares, assistant superintendent; D. Vega, chief chemist; C. Manfrino, general sales manager. The Atoyac Cement Co. abandoned the production of "Landa" portland cement during the past year and is now confining its production to its all-purpose "Atoyac" cement and the masonry product "Plastocement," both of which are produced under the Blank patents. W. B. Williams has recently completed the installation of two new tube mills and accessory equipment and has returned to his home at Woodland, Mich., for a vacation period of several months.

### New President

DIAMOND PORTLAND CEMENT CO., Middlebranch, Ohio, directors have elected Richard D. Raff president and general manager, succeeding his father, H. D. Raff, who died the latter part of December. Richard D. Raff has been vice-president, assistant general manager and sales manager of the company.

### More Dam Cement

OLYMPIC PORTLAND CEMENT CO., Bellingham, Wash., has received an additional order of approximately 150,000 bbl. for the Coulee dam. In 1935 it was given a contract for 770,000 bbl. and about half of that has been shipped to the dam. The total of 920,000 bbl. represents well over \$1,000,000. The company's plant has been operating steadily since it began manufacturing the special dam cement.

### Long Service Rewarded

UNIVERSAL ATLAS CEMENT CO., Chicago, Ill., recently presented a silver medal to Charles L. Johnson, marking the completion of 25 years of service in selling white cement as well as 44 years' continuous service in the cement industry. Mr. Johnson is credited with selling the first barrel of Atlas white cement and with the opening and development of the California market—one of the largest users of the product. He has sold white cement in every state and important city and is credited with knowing more architects than any man in the country.

## Agricultural Limestone Producers Meet

THE Midwest Agricultural Limestone Institute met at the Palmer House, Chicago, January 12, to elect officers and to informally discuss business conditions. The gathering comprised Illinois limestone producers and others from Missouri and Indiana serving the Illinois market.

E. J. Krause, St. Louis, Mo., was elected president for the year 1937. Other officers are Larry Fay, Chicago, Ill., vice-president; Dan Sanborn, Kankakee, Ill., secretary; George Hart, Kentland, Ind., treasurer. Seven directors were chosen to represent all regions of the territory served by the institute. They are W. H. Traver and Larry Fay, northern district; E. J. Krause and C. C. Schmoeller, southern; W. N. Carter, central; E. C. Koerper, western; and L. R. Cartwright, eastern.

This was the first meeting of the group since May 16, 1935, when an improved spring business was reported. Reports at this year's meeting showed that about 1,000,000 tons of agricultural limestone were sold in the midwest territory in 1936, and the sale of about 1 1/4 million tons in 1937 was predicted. About 720,000 tons were on hand in stockpile at the beginning of the year. Storage has been reduced during the year to about 227,000 tons, with the result that it will be difficult to supply the 1937 demand, if it is as good as that in 1936. Some of the producers reported that sales are now in excess of their plant capacities.

It was generally agreed that the Federal Soil Conservation Act was responsible to a large degree for the increase in business and that such money would continue to be made available to farmers in 1937. Through the efforts of the Illinois Agricultural Association and its advertising, agricultural limestone has been widely publicized for use on farms, with the result that many farmers have been encouraged to try it. One of the producers suggested that a good advertising supplement would be for those members who so desire to exhibit their products collectively at the next state fair at Springfield, Ill. The secretary volunteered to make necessary investigations as to the feasibility of the plan and to submit a report. An interested guest was W. C. Sparks, Cedar Bluff Quarry, who has been very actively merchandising agricultural limestone from his Princeton, Ky., plant.

## City Office

AMERICAN ROCK CRUSHER CO., Kansas City, Kan., is building an office building in town. John Naulty is plant manager.



E. M. Fleming

## P.C.A. Appointments

APPOINTMENT OF E. M. Fleming as regional manager of its eastern offices with headquarters in New York, and the naming of H. J. McDargh as southeastern regional manager, have just been announced by W. M. Kinney, general manager of the Portland Cement Association. Mr. Fleming has been district manager at New York since March, 1935. Mr. McDargh, who will make his headquarters in Atlanta, Ga., has been district engineer at Indianapolis since 1934. Mr. Fleming joined the staff of the Association in 1926 and Mr. McDargh in 1924.

Mr. Fleming's appointment fills a vacancy made by the resignation of J. R. Fairman as eastern regional manager to join the Pennsylvania-Dixie Cement Corp.

Mr. Fleming before going to the New York office was manager of the Association's highways and municipal bureau. During his service as such he directed the Association's concrete road condition survey of over 6,000 miles of concrete roads and was responsible for the construction of the Elmhurst cement bound macadam test road built by the Association to get data on the best method of building this type of pavement. He has represented the Association on committees of the Highway Research Board, American Society of Testing Materials, American Road Builders' Association, American Concrete Institute and other national technical organizations.

Prior to coming to the Association, he was associated with the Illinois Division of Highways. He is an alumnus of the University of Pennsylvania and is a member of the American Society of Civil Engineers.

Mr. McDargh joined the staff of the Association in 1924 as a fieldman in the

Indianapolis district. He was made office manager of the Association's Columbus office in 1930 and transferred in 1931 to Chicago as assistant to C. D. Franks, manager of the midwestern offices. He has been, since 1934, district engineer in charge of the Indianapolis office of the Association. During the past year, Mr. McDargh has been president of the Indianapolis Construction League.

He was formerly with the bridge department of the City of Chicago, engineering department of the Illinois



H. J. McDargh

Central Railroad and the Indiana State Highway Commission. He is an alumnus of Rose Polytechnic Institute.

## Management Changes

CEMENT PROCESS CORP., New York City, announces that John A. Blank, chemical engineer, has been placed in charge of the cement plant division with headquarters at Allentown, Penn. The Cement Process Corp. controls the Blank patents for the production of new processed masonry and all-purpose cements. W. Kuntz has been placed in charge of the lime plants division of the corporation at York, Penn.

## Promotion

FLORIDA PORTLAND CEMENT CO., Tampa, Fla., has promoted M. M. (Jack) Frost from district sales manager at Jacksonville to assistant director of sales at home office at Tampa. Before leaving Tampa he was given a farewell banquet by his many friends in Jacksonville, where he has been prominent in civic affairs.

## State Competition

WEST VIRGINIA state budget commission has approved an appropriation of \$100,000 for several agricultural limestone grinding plants in different parts of the state, to be operated with convict labor.

# Standard Portable Units Make Permanent Plant

By Bror Nordberg

PORATABILITY in a stationary plant setting, and a plant design permitting large-scale operation with a minimum of labor explain why the Hartland-Verona Gravel Co. is busy filling road and construction contracts at its Verona, Wis., plant.

Originally the Verona Sand and Gravel Co. operated a 1-*yd.* dragline plant in this pit. This plant and 65 acres of land, most of which contains good gravel, were sold to the Hartland-Verona Gravel Co. in 1934.

One of the first plant improvements in 1934 was the addition of a 9x36-in. Cedar Rapids jaw crusher, a 42-in. by 6-ft. vibrating screen and a 40-in. by 18-ft. revolving screen, to increase production. Then the dragline was replaced by a gasoline-powered shovel and three Mack trucks, and plant capacity averaged 100 tons per hour. This plant was electrically powered throughout, at a cost of approximately \$400 per month. This plant was dismantled and the new, flexible one illustrated here was first placed in operation late in June, 1936.

## Deposit

The deposit is of glacial origin, with a generous number of 12-in. and 14-in. boulders distributed throughout and some few up to 4 ft. by 3 ft. in size.

Fines are comparatively scarce and make up a necessary part of the torpedo sand instead of being separated and sold as masons' sand. The deposit is covered with from 4 to 6 ft. of overburden, with good gravel to a depth averaging 50 to 55 ft. The gravel is being excavated to a depth of 20 to 25 ft. The other 30 ft. is below the water table. The deposit could be classed as very coarse and as varying considerably in the distribution of boulders.

## Plant

The new plant design is such as to eliminate long and expensive hauls to the screens and to have a capacity to take care of two road contracts at one time. It consists, in the main, of the excavating shovel, two movable field conveyors, a portable closed-circuit crushing unit and a portable screening and washing unit.

Stripping and excavating are done by a high-speed  $\frac{1}{2}$ -*yd.* P & H shovel, powered by a Ford V-8 gasoline engine. The shovel fills a 4-*yd.* field hopper, which in turn discharges to a 60-ft. c. to c. field conveyor, the flow being regulated by an eccentric feeder driven off the conveyor. A 12-in. hinged grizzly over the field hopper catches any larger stone. Part of the shovel oper-

Hartland-Verona Gravel Co.  
Operation in Wisconsin Meets  
a Common Problem in an  
Unusual Way

ator's duty is to remove these large boulders, by lifting one end of the grizzly with his shovel. The 30-in. belt conveyor is driven by a 15-hp. motor through Texrope and chain and sprocket drives.

This conveyor discharges to a second 24-in. belt conveyor, operating on 95-ft. centers. A  $7\frac{1}{2}$ -hp. motor powers this conveyor through Texrope drive and a chain and sprocket drive. The conveyor carries the mixture of sand, gravel and small boulders to the crushing unit.

The conveyors and field hopper are manufactured by the Lippmann Engineering Works, Milwaukee, Wis.

The discharge from the second field conveyor passes to a 30-in. conveyor belt on 20-ft. centers, which passes over the top of the crushing unit. The crushing plant in its entirety, including the Peck conveyor and both crushers, is also manufactured by Lippmann Engineering Works.

## Screening

The 30-in. conveyor discharges to a 4-ft. by 12-ft. double-deck vibrating screen with 2-in. square openings on the top deck and 1-in. on the lower deck. Gravel and boulders retained on the top screen are chuted to the 14x45-in. primary jaw crusher below; material pass-



This small, high-speed shovel meets demands for production of 200 tons of sand and gravel per hour at Verona, Wis., plant

ing the 2-in. openings and retained on the 1-in. goes to a 24x42-in. two-roll crusher; and all throughs from the 1-in. screen pass direct to the washing and screening plant. The product from the two crushers passes to a Peck conveyor, with 30x14-in. buckets, below, which elevates it and discharges to the 30-in. conveyor carrying fresh material to the vibrating screen. All aggregate is circulated through the system until it passes the openings of the lower deck of the vibrating screen before going to the washing plant. The lower deck screen is 1-in., 1½-in. or ¾-in., according to the particular order being filled.

All aggregate passing this screen is carried up a 30-deg. incline to the washing and sizing plant over a 24-in. Lippmann belt conveyor operating on 90-ft. centers.

#### **Washing**

The conveyor discharges to a square metal washing box, and wash water is applied at this point from a Fairbanks-Morse pump with 6-in. suction and 5-in. discharge, as the material passes to the combination 48-in. scrubber and rotary, double-barreled screen. The scrubber section is 5½ ft. in length, and the screen is 7½ ft. long. The screen section has an outer jacket with ¼-in. round openings, and the inner screen has 1-in. round openings.

Minus ¼-in. material goes by gravity to a homemade sand drag 24 ft. long

with 48-in. paddles. Sand (¼ in. down to 100-mesh) passes either through a sand flume to stockpile or to the bin below. Gravel passing the 1-in. openings and retained on the ¼-in. is split over two Robins Gyrex 6-ft. by 42-in., double-deck vibrating screens. Rejects pass off to the ground. Pea gravel (over ¼ in.) is separated out over a deck with ⅛-in. openings and passed to a bin below. No. 1 stone (⅛ in. to ⅜ in.) is also separated out over the screen and stocked in the bin below, and a ⅜-in. to 1-in. size is produced by rejections of the vibrating screen.

The rotary screen and sand drag are driven by a 25-hp. motor, and a 5-hp. motor drives each vibrating screen.

The plant is erected in approximately the center of the pit being worked, on the pit floor just above the ground water level. The section of the pit diametrically opposite the face being worked has been excavated to furnish a supply of wash water. Water discharged from the washing plant is settled out and returned to the clear water supply to be re-used. The plant has a four compartment steel and wood bin 36 ft. long, with a total capacity of 200 tons.

#### **Shipping**

Shipping is done by rail and by truck. The company operates three 4-yd. Ford trucks, one Ford 6-yd. semi-trailer, and two 5-yd. Mack trucks. An all-weather

road has been built to allow empty trucks to enter one side of the pit, pass under the bins and continue on out of the pit at the other end with their loads. These same trucks serve to haul from the bins to stockpile.

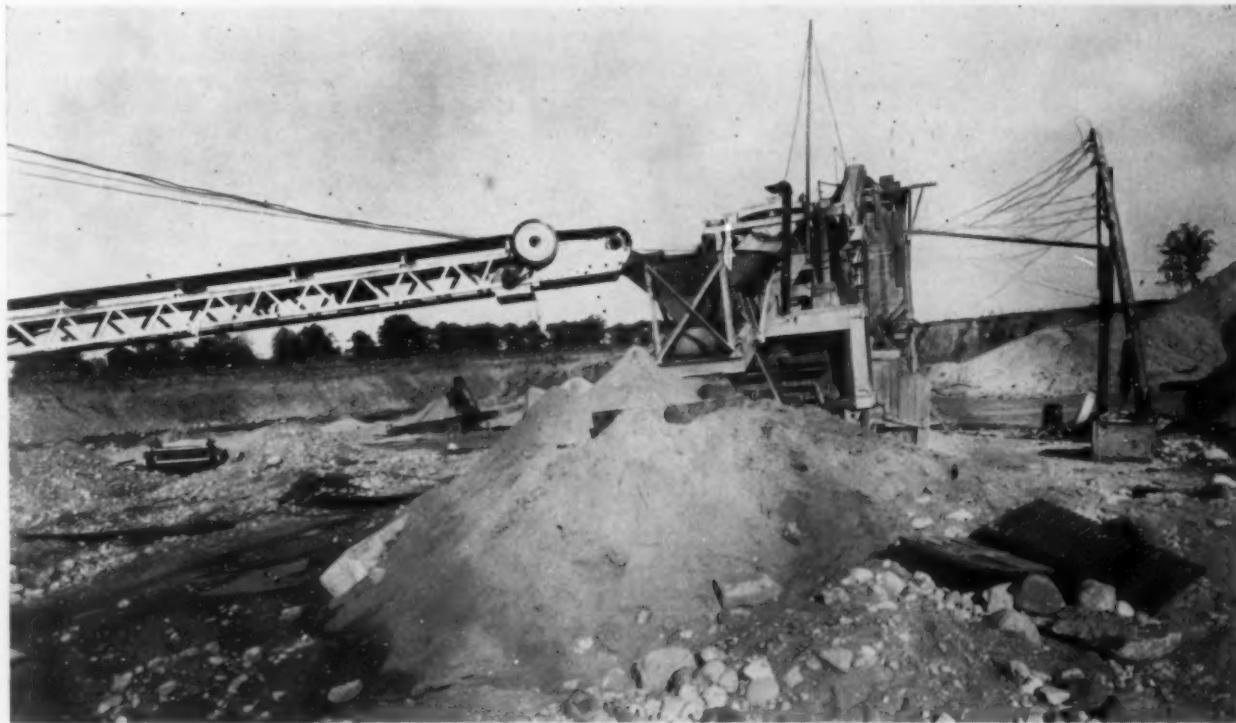
A 19-car spur has been built from the Chicago and Northwestern Railway tracks a quarter of a mile away, and trucks haul from the plant to three loading ramps when loading cars.

The company is fortunate in having a deposit requiring so much crushing, for crushed gravel is particularly desirable for concrete. It is estimated that approximately 85% of all gravel produced is crushed. Practically all pea gravel is crushed. Pea gravel is sold practically as fast as produced for use in black top road construction and represents about 10% of the total gravel production.

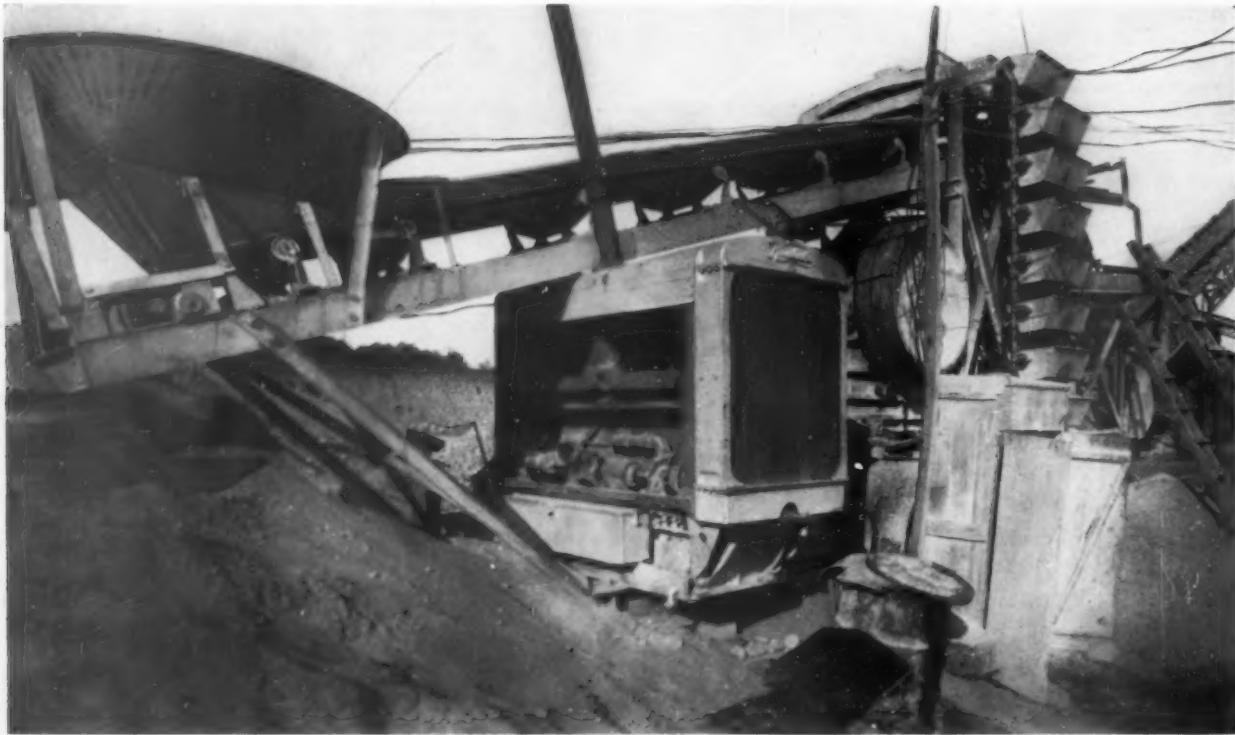
Pea gravel is drawn from its bin and stockpiled over an 18-in. Lippmann belt conveyor with 50-ft. centers. Material is loaded from stockpile into trucks by a Northwest gasoline-driven crane with a 1-yd. clamshell bucket.

#### **Power**

Power for driving all screen motors as well as the sand drag and conveyors is generated in the crushing unit. A compact arrangement permits a 185-hp. Waukesha-Hasselman oil-burning engine to drive some of the moving equipment direct while, at the same time,



The crushing unit, in center, is movable on its own wheels. The field conveyors are operated by remote control



A single oil burning engine drives the primary crusher as well as the generator to electrify other equipment

the 40-kv.a. generator supplies electrical energy to drive other plant motors. The engine has a sheave for 13 V-belts on its shaft. Nine of these belts connect to the driving mechanism of the primary crusher direct, three drive the generator, and one drives the exciter. A system of chains and sprockets from the primary crusher drives the secondary crusher, the Peck conveyor, the vibrating screen, the conveyor over the screen and the washing plant conveyor, from its

tail pulley. All mechanical equipment, except the pump, is driven by motors receiving their current from this generator. The engine burns an average of 9 gal. of No. 2 fuel oil per hour at a cost of 5½¢ per gal. in tank car lots.

The plant is equipped with Hyatt ball or roller bearings throughout.

#### Man Power

Two men are required to operate the plant—a plant having an output of 200

tons per hour when the lower deck of the scalping screen has 1½-in. screen cloth. One man handles the shovel exclusively and removes oversize boulders from the field hopper grizzly. The other man is stationed at the crushing unit, where he can oversee operations and control all switches. In the event of an emergency, such as the lodging of a large boulder or tearing of a belt, this man can press a button at the switchboard and stop the first field conveyor



Either or both field conveyors can be moved in an hour; the screening plant, shown in center, is equipped with skids for portability

immediately and all feed to the plant.

#### Movability

The plant is entirely portable, to do away with long transportation from the pit. Either one, or both, of the field conveyors can be moved in an hour to a new working location. The conveyors are supported on wood framework and are easily hauled to a new location by the excavating shovel.

Likewise, when these conveyors have reached their limit, the crushing unit and screening plant can be moved. The crushing unit is portable on its own wheels. The screening plant is supported on 24x16-in. skids, so that the plant can be moved on 4-in. rollers. The same shovel is used to move these larger units, which can be relocated and again placed into operation in 1 or 2 days. It is expected that the field conveyors will be moved several times a year and that one move of the larger units will be made each year.

An unusual feature is that the wash water pump is anchored to the skid of the washing plant and moved with it. A ditch is dug from the water supply to the new location, and the water is made to follow the plant very simply instead of adding to the pipeline.

Since the new plant was placed in operation on June 23, 1936, it has been running consistently to turn out aggregate for highway contracts, for black-topping and for general construction. Among the contracts are a 7-mile highway job near Sparta, Wis., a 1½-mile road at Baraboo, Wis., and 11 miles of black-top road. P. W. Palmer and J. E. Palmer own and operate the plant as partners. Ray F. Palmer is superintendent.

#### Consolidation

RAY SAND AND GRAVEL CO., Oxford, Mich., recently was combined with the C. N. Ray Corp., Ray Fuel Co., Ray Land Co., State Concrete Materials Co. and Road Builders, Inc., to form a new concern, Ray Industries, Inc. The consolidation was made to secure more economical and effective operations. Personnel is to be unchanged.

#### Dismantling

CONSUMERS CO., Chicago, Ill., recently dismantled its large gravel plant at Burlington, Wis.

#### Protest City Gravel Pit

RESIDENTS have protested against the proposed purchase by the city of DES MOINES, Iowa, of a 14-acre gravel pit, which the city intended to operate. Reasons given were that the residential properties in the vicinity would be depreciated in value.

#### County-Owned

FAYETTEVILLE COUNTY, TEXAS, is reported to be investigating freight rates, with a view to producing sand and gravel from a 100-acre tract of land owned by the county for 20 years.

#### New Superintendent

FLORIDA GRAVEL CO., River Junction, Fla., has appointed Paul Thomas superintendent to succeed W. B. Richards.

#### Leases New Deposit

MYLES GRAVEL CO., Jackson, Miss., has leased an additional tract of gravel land. Mr. Traxler, superintendent, has moved machinery and all equipment to the new location.

#### Moves for Contract

THE STATE GRAVEL CO., Lexington, Miss., recently removed its machinery and equipment to Lake Cormorant where it has a gravel contract with the highway department on the Robbinsville-Lake Cormorant highway. When the contract is completed, the plant will be returned to Lexington.

#### New Semi-Portable Plant

NORTHWESTERN GRAVEL CO., Lake View, Iowa, will open a new gravel pit this spring near Lake View. Operations are expected to start April 1, from an all steel semi-portable plant to be erected. Gravel will be shipped from a new railroad spur recently built and also by truck to nearby jobs.

#### Sand and Gravel Bonus

MOUNT CARMEL SAND AND GRAVEL CO., Mount Carmel, Ill., recently presented each employee with a sizeable bonus check, representing 5% of total wages for 1936.

#### Modernizing

TIoga WASHED SAND AND GRAVEL CO., Tioga, Penn., is tearing down its old plant preparatory to building a modern plant of concrete and steel. Much new machinery is to be installed when the buildings are completed.

#### Fire Damage

CONNECTICUT HIGH TEST SAND AND GRAVEL CO., Hamden, Conn., suffered \$40,000 damage to its buildings and equipment recently by fire due to faulty electric wiring.

#### Sand-Lime Brick Producers to Meet

THE SAND LIME BRICK ASSOCIATION will hold its annual convention February 18 and 19 at Statler Hotel, Boston, Mass.

#### Sand-Lime Brick Production and Shipments

THE following data are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States. They may be considered representative of the industry.

Twelve active sand-lime brick plants reported for the month of December, this number being two more than that reporting for the month of November, statistics for which were published in January.

#### Average Prices for December

Shipping Point	Plant Price	Delivered Price
Pontiac, Mich.	\$11.00	\$14.00
Grand Rapids, Mich.	11.00	
Detroit, Mich.		13.50
Mishawaka, Ind.	9.25	
Syracuse, N. Y.	12.00-14.00	16.00-20.00
Saginaw, Mich.	10.50	
Madison, Wis.	11.50	13.00
Watertown, Mass.	11.50	12.50
Flint, Mich.	12.00	13.00

#### Statistics for November and December

	Nov. <sup>†</sup>	Dec. <sup>*</sup>
Production	3,395,575	4,126,835
Shipments (rail)	55,000	284,000
Shipments (truck)	3,152,607	3,558,948
Stocks on hand	1,736,649	2,195,240
Unfilled orders	1,800,000	3,127,500

<sup>†</sup>Ten plants reporting; incomplete, three not reporting unfilled orders.

<sup>\*</sup>Twelve plants reporting; incomplete, three not reporting unfilled orders.

#### Sells Interest in Affiliate

GYPSUM, LIME & ALABASTINE, CANADA, LTD., Paris, Ont., has sold its minority interest in Gyproc Products, Ltd., Rochester, England, but will continue to act as technical adviser and consultant.

#### Brick Producer Active

SIOUX FALLS PRESSED BRICK CO., Sioux Falls, S. D., has received PWA contract for sand-lime brick for the city armory, and is also furnishing brick for the Augustana College gymnasium.

#### "Flexible" Sandstone

CHARLES HUNTER, junior TVA geologist, recently unearthed, in Forsyth county, N. C., the first flexible sandstone ever discovered in the United States. The material has alternate layers of mica flakes and sand grains which give it flexibility. Its only value is said to be as a novelty.

#### Molding Sand

FARMERS IN RICHLAND COUNTY, near Evansville, Ind., are engaging in molding sand production, or are selling land, on which a deposit of molding sand has been opened. The deposit is being excavated to a depth of 20 ft.

# Recent Improvements at Plants of the General Crushed Stone Co.

## Developments in Asphalt Mixing Plants

By Bror Nordberg

THE DEMAND for "Amiesite" surfacing and retread for highways in New York State and Pennsylvania has been such that numerous stone producers have equipped their plants to produce bituminous mixtures on a large scale. One of these, the General Crushed Stone Co., Easton, Penn., has built Amiesite plants at all of its New York stone plants and also a plant at Horseheads, N. Y. The company lately improved several of these plants; among these improvements are the first electric bitumen heaters to be installed in the United States (at Auburn, N. Y., and Rock Hill, Penn.).

The Geneva, N. Y., Amiesite plant was built in 1934, and in 1936 was improved by the addition of a second. 2-ton pug mixer and 540-ton additional bin storage, as well as the installation of a dust-collecting system. This unit has a dryer capacity ranging from 45 to 55 tons per hour, varying with the size of aggregate, but now has sufficient storage to permit shipments of about 800 tons daily.

The plant was originally designed by the Barber Asphalt Co., and was equipped with a 2-ton Iroquois mixer and four bins of 110 tons capacity, directly above the mixing platform.

The plant serves Pennsylvania as well as New York and is equipped to handle the necessary sizes of aggregate required by their specifications.

The four sizes treated in this plant are No. 2 (chestnut coal size), No. 1 (pea coal size), No. 1A (slightly larger than pea coal) and screenings ( $\frac{1}{8}$ -in. down). The No. 1A stone goes into top surfacing, and screenings are used for both top and bottom courses.

Aggregates are hauled to the mixing plant in 3-yd. and  $2\frac{1}{2}$ -yd. end-dump trucks from the stone bins nearby. The

trucks dump to a small hopper, from which a 28-ft. c. to c. Link-Belt bucket elevator raises the stone and discharges directly into the dryer.

### Dry Stone Storage

The Barber dryer is 40-ft. long with a 66-in. diameter and is fired by a National fuel oil burner. The Norblo dust collector installed in 1936 serves a dual purpose—to remove dust from the dryer and to furnish draft for the dryer. A Buffalo mill exhauster, with a size 70 fan, furnishes the necessary air. The cyclone is 9 ft. in diameter and is 50 ft. high including its stack.

Stone is dried, then cooled to approximately 100 deg. F., after which it is discharged to the foot of a 70-ft. c. to c. Link-Belt elevator with 12-in. buckets, wholly enclosed. As designed in 1934, the stone was elevated direct to the bins above the mixing floor. The elevator now raises the stone to the 540-ton bins (four) recently installed. The elevator discharges to a three-deck 3x10-ft. Niagara vibrating screen, which segregates stone to the proper bins. The dried stone can be drawn for railroad shipment in closed cars; some is shipped to the Horseheads, N. Y., plant.

These bins were installed mainly to increase the plant mixing capacity.

which otherwise would be limited by the dryer output and be unable to meet present demands. Dried stone is drawn from this "intermediate" storage to fill the bins in the mixing tower. The transfer is done by conveyor belts.

### Mixing Plant

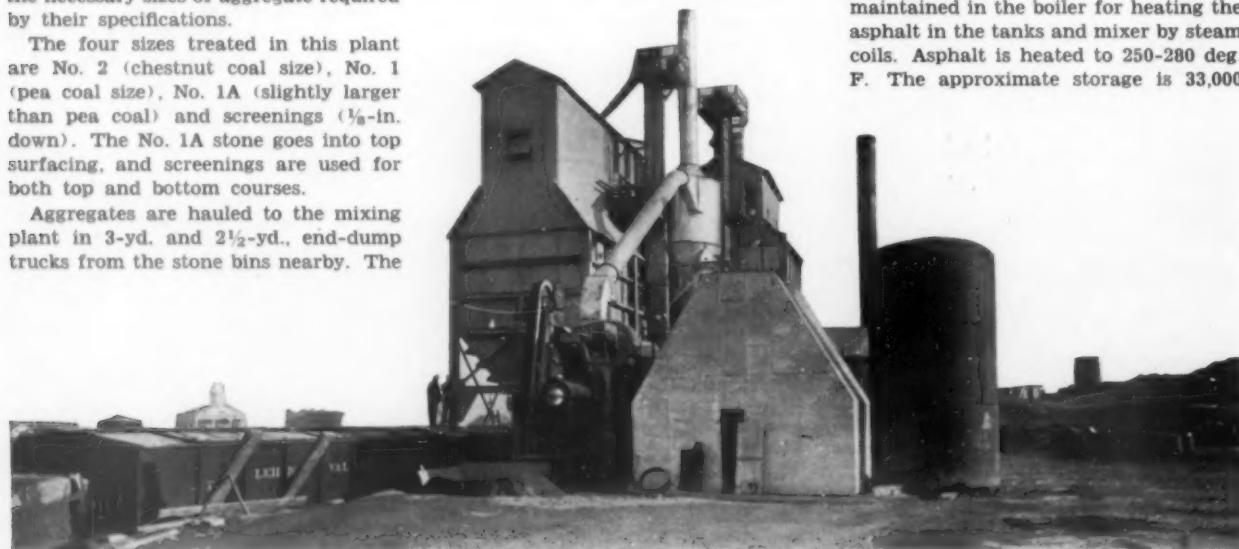
Stone is drawn to a 24-in. belt conveyor about 30 ft. long traveling the length of the bins and discharging to a 24-in. belt on 10-ft centers which in turn feeds the end of a 68-ft. centers Link-Belt elevator with 16-in. buckets. The elevator discharges to the bins in the mixing tower. Dust is removed from both elevators, the screen and the mixing platform, as well as from the dryer, by the Norblo collector. Such dust practically all passes a 42-mesh.

A 2-ton Warren Bros. mixer was installed in 1936 to double the mixer output.

Stone is weighed on a double-faced Howe scale and asphalt is weighed by two Buffalo scales. About 10 to 18 gal. of bitumen is added per ton of rock, depending on size, naphtha and lime are added, the whole being mixed three minutes.

This mixture is unloaded direct to trucks for short hauls or to a 30-ft. centers 30-in. belt conveyor to railroad cars.

A steam pressure of 95 to 100 p.s.i. is maintained in the boiler for heating the asphalt in the tanks and mixer by steam coils. Asphalt is heated to 250-280 deg. F. The approximate storage is 33,000



The Geneva, N. Y., Amiesite plant of General Crushed Stone Co. Note firing end of stone dryer, at its feed end and dust collecting system



**LEFT**—Close-up of firing end of rotary stone dryer at Geneva plant. Truck hopper is at left of view. **RIGHT**—The automatically controlled electric asphalt heater at the Auburn, N. Y., plant. A view of the heater installed at General Crushed Stone Co.'s Rock Hill, Penn., plant was published in *Rock Products*, January, 1937, page 73.

gal. for asphalt, 10,000 gal. for naphtha, and 10,000 gal. for No. 4 fuel oil. General Electric motors are used to drive all equipment. A 75-hp. motor drives each of the pug mills; a 15-hp. motor drives the fan that draws dust from each end of the dryer to the center; a 50-hp. motor drives the dryer, through a Link-Belt speed reducer; a 5-hp. motor drives each of the belt conveyors; a 7½-hp. motor drives the 70-ft. centers elevator; and a 10-hp. motor drives the 68-ft. centers elevator.

#### Electric Heater

The Auburn, N. Y., plant is of Farasey design, and was rebuilt in 1934. Trucks haul aggregate to a 3-yd. hopper from which a 25-ft. centers Link-Belt elevator raises the stone to a 5 x 30-ft. rotary dryer. The dried stone is raised by a 70-ft. Link-Belt bucket elevator to four bins of 60-ton capacity. The stone first passes over a double-deck 3x10-ft. Niagara screen for sizing before falling to the bins. The asphalt and stone are mixed in 1½-ton batches.

Recently a Clarmac electric bitumen heater, manufactured in this country by the Easton Car and Construction Co., was installed at this plant to heat the asphalt before it is pumped to the mixer. The heater has a tank of 3000-gal. capacity, sufficient for an ordinary day's run.

The steam-coil heating system is still maintained in the 20,000 gal. asphalt storage tank. At the end of a day's run

asphalt at about 220 deg. F. is pumped from storage into the electric heater tank, and during the night, is brought to the required temperature of 280 deg. ready for the next day's operation. A gear pump located in the bottom of the heater, near the thermal units, pumps the hot asphalt to the mixer through 3-in. pipe which returns to the heater, forming a closed circulating system. The mixer operator merely turns on a valve at the mixer when asphalt is needed.

#### Rock Hill Plant

A similar electric unit was more recently installed at the Rock Hill, Penn.,

plant, and marked savings and an improved product have resulted.

The heater itself with its 3000-gal. tank is very compact, being 6 ft. wide by 7 ft. high by 10 ft. long. Temperature is kept at an even level by a Bristol F. and maintained at that temperature, recording pyrometer which automatically shuts off and turns on the thermal units. This particular heater is equipped with two Mercoid switches set at 275 deg. F. and 285 deg. F. As the temperature reaches 285 deg., the units shut off, and when cooled to 275 deg., they automatically turn on.

The heater consists of 15 thermal units, somewhat similar to those in an

**Chart I—Summary of 3 Months' Operation of Electric Asphalt Heater**  
3000-Gallon Heater

	1	2	3
Minimum tons per day.....	8	10	5
Maximum tons per day.....	204	127	186
Average tons per day.....	60	17	43
Average kw. per day.....	118	98	119
Average tons per working day.....	90	45	61
Average kw. per working day.....	133	125	132
Average kw. per idle day.....	85.5	81	96
Average kw. per ton.....	2.024	5.78	2.81
Average kw. per ton per working day.....	1.55	2.85	2.00
Total kw. per month.....	3648	3032	3566
Total tons per month.....	1802	525	1271

#### Approximate Kw. for Various Quantities of Amesite Produced Per Week

Tons of Amesite	Kw. per ton	Tons of Amesite	Kw. per ton
100	6.75	600	1.40
200	4.20	700	1.20
300	2.80	800	1.10
400	2.00	900	1.05
500	1.60	1000	1.00

All kw. above includes current used for pumping as well as heating the bitumen.

electric bread toaster, each enclosed in a 2-in. diameter steel pipe extending from the heater front to within 2-ft. of the back. The fifteen units in this heater are adequate to meet the plant's demands. A 2 1/4-hp. motor drives the submerged gear pump for pumping heated asphalt to the three 1-ton Iroquois mixers. The thermal elements are heated by 440-volt electricity.

At this plant three concrete storage tanks and one steel tank of asphalt, total capacity 40,000 gal., are maintained, heated to a fluid temperature by steam. Results of electric heating have been such that similar units are being installed so that electrically-heated asphalt can flow by gravity to the electric heater now in use.

#### Experience With Electric Heaters

Experiments are being made at the Rock Hill plant to determine the most satisfactory method of operation, but

**Chart 4—Temperatures as recorded by pyrometer which automatically shuts off and turns on thermal unit**

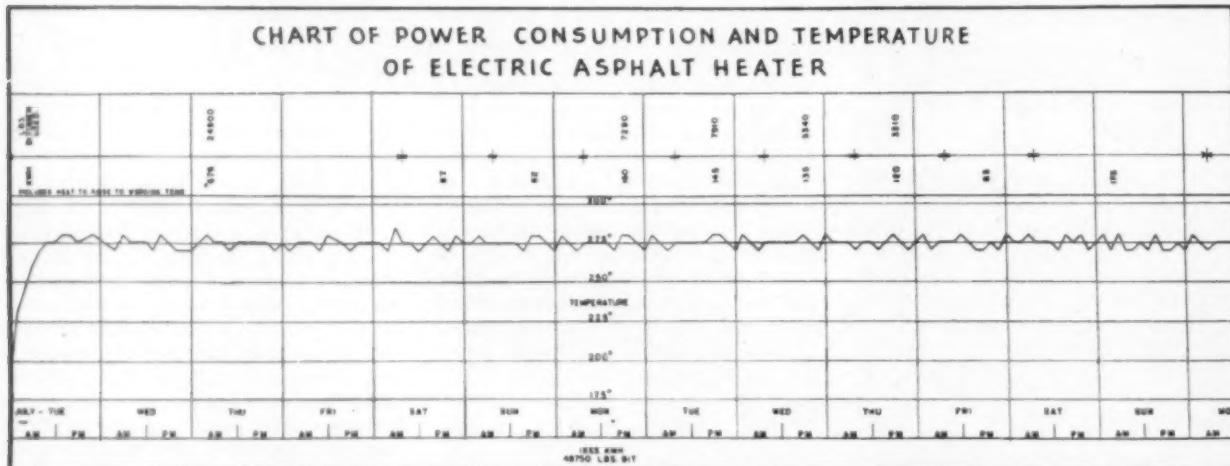
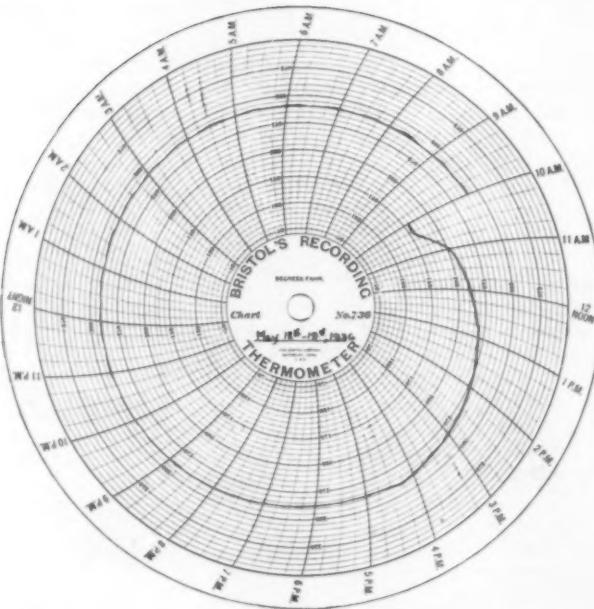


Chart 2, above, shows how evenly the temperature can be maintained over extended operating periods

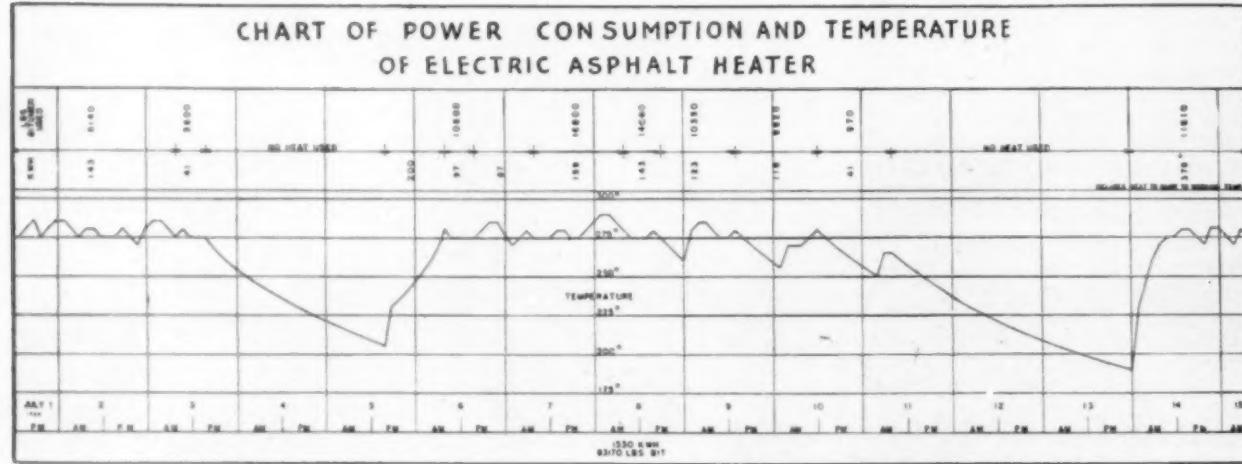


Chart 3 indicates gradual temperature drop when heater is shut off and rapid return to desired temperature when heat is re-applied

records already reveal great savings and a better, more uniform product.

At times the plant's daily output exceeds the 3000-gal. tank capacity. At such times, asphalt is pumped gradually from storage into the top of the heater at about 220 deg., and with all 15 units turned on, no temperature difference in the product pumped to the mixers is noted. At night, three units are generally sufficient to maintain the required asphalt temperature for delivery the next morning.

Test data drawn up for the first few months' operation reveal remarkably low heating costs per ton of Amiesite. The accompanying Chart 1 shows the average power consumption for various weekly outputs; Chart 2 shows the regular asphalt temperature maintained by electric heat; Chart 3 illustrates how rapidly temperatures can be reached after electricity is shut off and the asphalt allowed to cool. Chart 4 is an actual recording, showing the raising of asphalt temperature allowed to cool to 150 deg., to 275 deg. in 6 hours.

Other than costs, certain advantages of electric heating of bitumen over steam heating are self-explanatory.

The irregular heating due to steam pressures falling off is eliminated, and temperatures are known to be definitely maintained so that the mix does not "set" prematurely on the job. Overheating, and resultant "pitching" of the tank is out of the question, and the danger of moisture in the binder due to steam leaks is entirely obviated.

The installation of the 3000-gal. tank alone has simplified furnishing small orders and has done away with the practice of getting up steam early in the morning for the day's orders. The pump

is reversible so that pipe lines can be emptied in the evening. The heater is insulated with a 2-in. asbestos covering, so that the heat loss per hour when the electrical units are shut off is only 1 deg. per hour.

### Protest County Competition

CASPER STOLLE QUARRY & CONTRACTING CO., East St. Louis, Ill., employees to the number of about 100 appeared before the St. Clair county road and bridge committee recently to protest the contemplated purchase of \$20,000 worth of crushing-plant equipment in order that the county might compete with the Stolle plant and others already established in the county. The committee "passed the buck" to the county board.

### Rip-Rap Contract

E. C. SCHROEDER, Marquette, Iowa, has been awarded a contract for 150,000 tons of rip-rap by the Chicago, Milwaukee, St. Paul and Pacific Ry.

### To Produce Agricultural Limestone

A. A. GONCE LIME CO., Bridgeport, Ala., has been organized by a group of farmers and business men of Jackson county, Alabama, and Franklin county, Tennessee, to develop a limestone deposit near Anderson, Tenn. A. A. Gonce is president and treasurer; Wm. Setliffe, secretary.

### Manager Buys Company

E. B. & A. L. STONE CO., Fairfield, Calif., has been sold to J. M. Nelson, who has managed the rock-crushing plant of the company.

### New Kind of Road Money Diversion

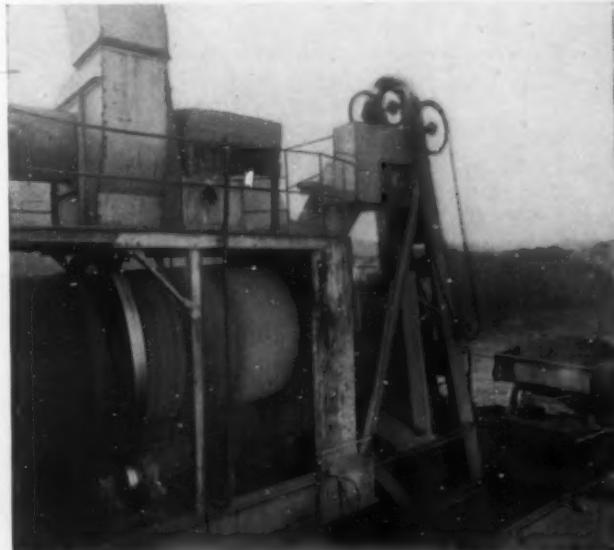
NORTH CAROLINA has hit on a new kind of highway fund diversion which stings crushed-stone producers two ways. The governor recently authorized use of \$100,000 of highway funds to increase the agricultural limestone production of the state's new crushing plant in McDowell county. The governor aims to reduce the present price of 80c per ton, f.o.b. plant, to at least 50c.

### Big Loader

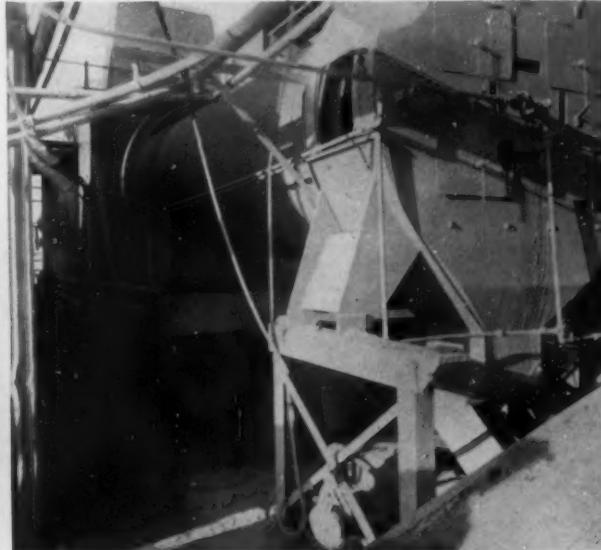
CONSOLIDATED STONE AND SAND CO., Montclair Heights, N. J., recently installed one of the largest Haiss loaders ever built. It is rated at 7 cu. yd. per minute and has actually loaded at the rate of 10 tons per minute (trap rock).

### Loses Out

LOUISVILLE CRUSHED STONE CO., Louisville, Ky., was "perpetually enjoined from operation of a quarry in such a manner as to be detrimental to property of nearby residents," on January 19, by the state court of appeals, upholding a decision of the lower court. Objection was made to blasting, but it is assumed that the quarry may still be operated using lighter charges of explosives. This case differed from others in which the courts have decided for the quarry company, in that the operation is a new one, and the nearby property owners had already established their homes there. In other cases, where the quarry was there first, the courts have held that the property owners were not entitled to anything more than safe operation.



Two views of the rotary stone dryer at Geneva plant. In the view at the left, note the double-duty fan, which induces draft in the dryer and removes dust from both ends of the dryer toward its center.



# A MODERN CEMENT PLANT BECOMES MORE MODERN

Peerless Cement Corp., Detroit,  
Makes Numerous Improvements

IMPORTANT equipment installations were made at the Peerless Cement Corp. plant in Detroit, Mich., as part of its modernization program, in 1936; and more are in the process of being made. Demands for cement last year required operation of all three kilns.

One of the additions was the installation of No. 144 B. & W. direct-fired coal units on each of the 11x175-ft. kilns. The new units, which dry and fire coal into the kilns in one operation, replace a centralized grinding mill, pump and screw feeders and conveying equipment to each kiln bin as well as to the 500-hp. auxiliary boiler coal bin.

It can be said that this improvement was made mainly for three purposes: a cleaner operation, safety of the men, and more economical fuel burning. The company is one of the few in the country that has its manufacturing plant within the corporate limits of a large city and has its raw materials shipped in. Naturally, dust is more serious than it would be if in an isolated location. The new direct-fired mills have served to materially reduce dust emanating from the firing floor, which incidentally is adjacent to well-traveled Jefferson Ave.

Several severe explosions had occurred in the old operation due to stocking of large tonnages of pulverized coal,

## Editor's Note

ADDITIONAL views of the improvements at the Peerless Cement Corp. plant were published on pages 76 and 77 of *Rock Products Annual Review Issue, January, 1937.*

resulting in considerable property damage. It is no longer necessary to stock pulverized coal, and that hazard no longer exists. Coal consumption per barrel of finished cement has been reduced.

The mills were placed in operation the first of April, five weeks after installation started. While the original kiln floor was not designed for such equipment, each unit was placed with no building changes except a hole in the floor and a slight cutting into a reinforcing member.

Each mill is driven by a 150-hp. G.E. motor through a Gates V-belt drive, the belt being split from the driving pulley to also drive the fan. Raw coal is loaded to a 40-ton hopper, outside the kiln building, by a clamshell bucket, and is carried on a 36-in. conveyor overhead to the bins. Each mill has its own 30-yd. bin directly above. These bins served as pulverized coal bins in

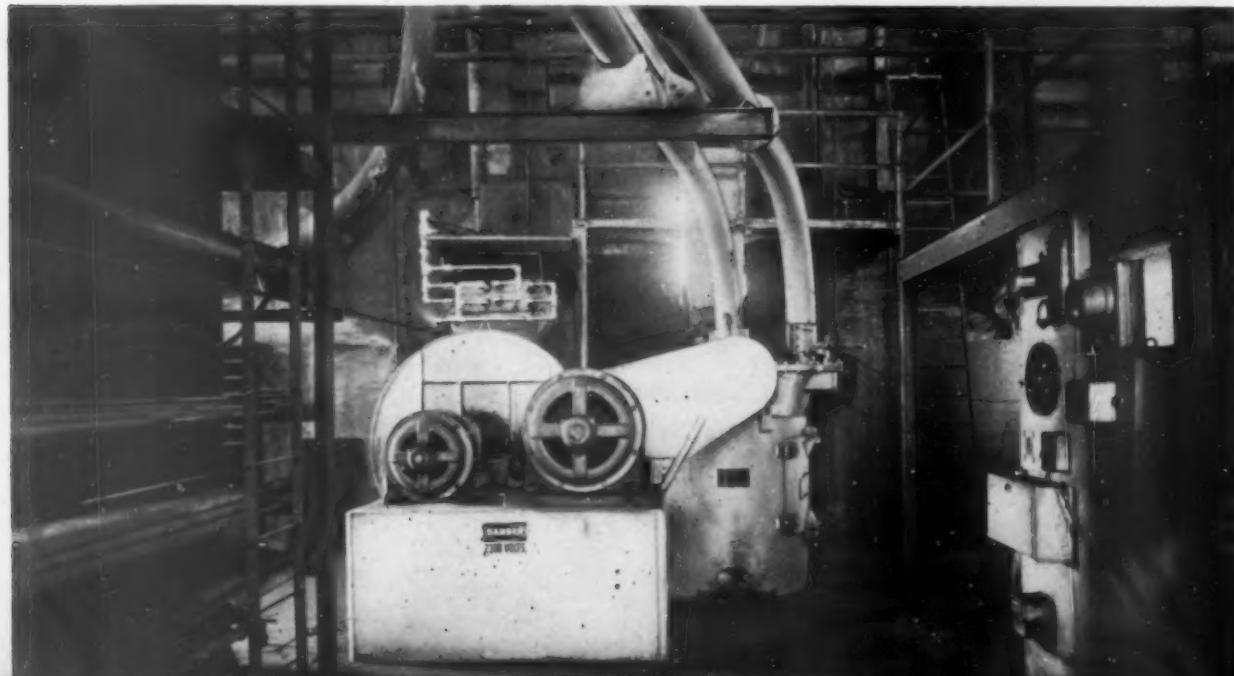
the original system. Iron impurities are removed by a Ding's magnetic separator before the coal passes into the bins.

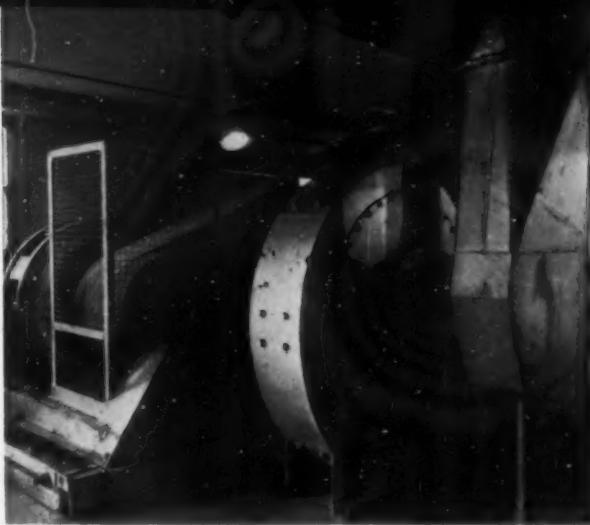
Approximately 8000-cu. ft. per minute of primary air passes through each mill. About 72% of the total is secondary air at atmospheric temperatures, and the remainder is preheated primary air.

Hot primary air can be taken from two sources to give the blend desired for any atmospheric condition. Primary air is taken into the mills by the fans through 24-in. diameter pipes. One takes heated air direct from the hood of the kiln. A hole in the kiln floor at each kiln directly above the chain conveyor carrying hot clinker to clinker storage contains a 24-in. pipe to the same fan, allowing hot air from the clinker to be drawn to the mills direct. However, this latter detail will be changed, for Vanderwerp recuperators are now installed or will shortly be installed on all three kilns.

Until this change is completed all the necessary primary air can be drawn from either source, but generally a proportion of each is used, depending on outside temperatures. The temperature of the mixture of primary air passing through the 12-in. diameter pipe from the mills to the kilns is generally 170

*When the centralized coal mill was replaced, the coal mill below was installed for firing the 500-hp. auxiliary boiler. Air is preheated; coal is blown to the boiler*





LEFT: Fan for direct-fired coal unit is driven by V-belt drive. RIGHT: The belt is split to drive the mill also

deg. The temperature of primary air drawn from the kiln hood approximates 1200 deg. and that taken from above the clinker is somewhat lower.

On very cold days, with temperatures below zero, practically all air is taken from the kiln hood. On very hot days, when the room temperature on the clinker-drawing floor below is excessive, the major part of the primary air is drawn from the clinker. This serves to better the working conditions for the men employed on this floor.

When the centralized coal mill was replaced, the source of coal supply for the 500-hp. auxiliary boiler was removed. A No. 121 B. & W. coal mill was installed for the boiler operation. Air is here preheated by an Aerol-fin heater, and coal is blown from 75 to 100 ft. to the boiler. A 25-hp., G.-E. motor drives the mill and a 30-hp., G.-E. motor drives the high speed fan.

#### Power House

The company has installed generating equipment in its power-house, which will allow full operation of all plant machinery without any supplemental purchased power. Two 2500-kv.a. turbo-generator sets have been used to generate power in the past.

In peak times, these units were supplemented with power purchased from the Detroit Edison Co., but during the lean years from 1930 through 1935 were sufficient to furnish power requirements for the curtailed operations, without any purchased power.

In 1936, power demands for full scale operation were in excess of that generated by these original electric units. The two 2500-kv.a. generator sets were displaced by larger units adequate to meet all power demands.

Two 3750-kv.a., G.-E. turbo-generator sets were installed. The generators are driven by Curtis steam turbines working under 200 p.s.i. pressure.

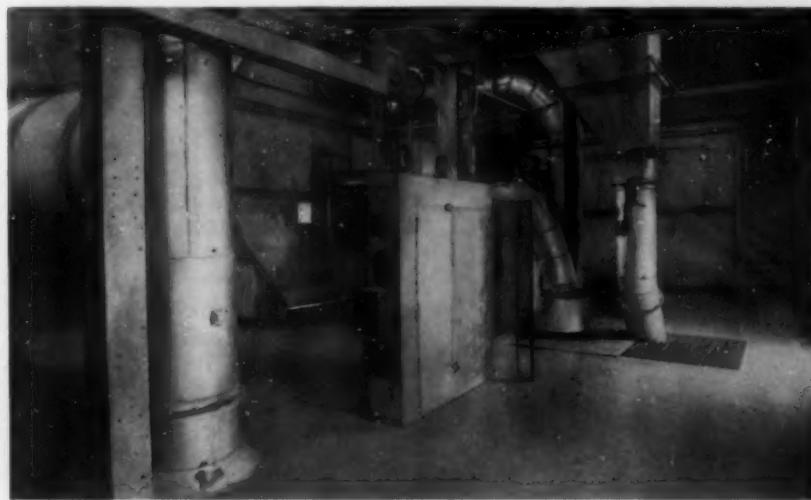
A motor-generator set was installed to excite the field coils of each genera-

tor. Each set consists of a 75-hp. Westinghouse Electric induction motor and a 65-kw., direct-current generator, operating at 1200 r.p.m. Eighty percent of the full load of the 3750-kv.a. generators will meet full capacity requirements of the plant.

#### Laboratory

A better control of testing specimens

in the company's laboratory is maintained since a moist curing room was installed recently. A constant temperature of 70 deg. and a relative humidity of 95 to 100 deg. is produced by a Humidyne, artificial weather maker. This is a product of the Moto-Color Sign Co., Detroit, Mich. The machine is readily adjustable and is driven by a  $\frac{1}{4}$ -hp. motor. (View of laboratory below.)



ABOVE: View of the firing floor. Note the air and coal intakes for the coal mills on floor below.  
BELOW: Humidity and temperature are kept constant in the laboratory moist-curing room by this new type "weather-maker"



# Chemists' Corner

## SOME REMARKS ABOUT HIGH EARLY STRENGTH CEMENT

By  
Dr. Gabriel A. Ashkenazi

RECENTLY one could find an opinion expressed in cement literature that the existent specifications of portland cement did not cover the requirements of customers. You could read that the use of cement became so general and the purposes so various, and the demands in regard to the properties so specified, that it seemed to be impossible to find in any one brand all the properties required.

Of course, there may occur special cases when a specially prepared, definite specification can be very useful. But the writer, who worked for nearly two decades in the cement industry, does not think that a regulation of production by issuing specifications connecting certain properties of portland cement with its composition could be profitable for a successful development of the cement industry. As an industrial chemist, the writer has always looked for the greatest possible simplicity and uniformity in the process of manufacture, and it seems to him that the introduction of several special specifications of this kind will bring a confusion in the systematic organized work of a cement plant.

What the customer requires today is a portland cement with a high value of tensile and compressive strength, with the lowest possible heat of hydration and with a minimum shrinkage while hardening. He requires also a strong resistance to sea water. Sometimes he may require a resistance against aggressive solutions. Regarding this requirement, no portland cement, due to its content of high saturated lime compounds, can resist the destroying action of these solutions. Among the hydraulic hardening materials there is only one, namely the rapid hardening high alumina cement, which can really withstand the destructive attack of aggressive water. However, regarding the other requirements the writer is convinced that a correctly prepared high early strength portland cement can fully comply with them.

### Early History

As far back as the year 1915, Mr. Spindel,<sup>1</sup> the counselor of The Austrian States Railways, published some inter-

### Editor's Note

THE AUTHOR makes some very timely remarks about high early strength cements. He has had twenty years' experience in developing them in Europe. He thinks American practice in the way of very high limed portland cements has been in the wrong direction.

Dr. Ashkenazi also believes that the tendency toward more complicated chemical formulae is unnecessary at this time; he does not believe that the properties desired in portland cement can be specified by its chemical composition. He believes extra fine grinding is an unnecessary and uneconomical method of obtaining early high strengths.

He believes (what every cement manufacturer hopes) that a standard portland cement may be made which has practically all of the characteristics desired in special portland cements, with the possible exception of high resistance to sea water.

—The Editor.

esting experiments with a new kind of portland cement of high initial strength. This improved portland cement was named by him "early high strong" (frueh hochfest). But at that time this new variety of portland cement did not find a large acceptance. One cement plant, in Vorarlberg, Austria, began to produce this brand in limited quantities. The greatest part of cement producers had not enough confidence in this material, because of the higher than usual content of lime in its composition. The fear of a higher lime content in portland cement was at that time widespread. Especially the customers were afraid of so-called "free lime" in cement, although the conception of it was pretty misty and no exact method of determination of this "free lime" was known.

During the world war M. Bied, a chemical engineer of a French cement company, discovered a new hydraulic

binding material, the high alumina cement (ciment fondu). The discovery of this cement with its exceptionally high initial tensile and compressive strengths had a great influence on the development of the industry. Due to the lack of necessary materials, bauxites, which could be found in suitable quality only in France and partly in Yugoslavia, the alumina cement could not be economically produced in other countries of Europe. Therefore, when, after 1920, the French alumina cement came to the European market in larger quantities, cement manufacturers came back to the invention of Spindel and started to produce an improved portland cement which could compete with the French alumina high strength cement. The German and British manufacturers were the first to come out with the cement of super quality, which was brought into the market under name of "high value," or "rapid hardening," or "high early strength" cement. Whilst the alumina cement was a special kind of hydraulic hardening material, the new brand presented only a more refined kind of the old portland cement made of higher limed raw mixtures.

The introduction of this high grade portland cement is one of the greatest achievements which the cement industry has made in the last twelve years. The assumption that the most essential part of the different constituents of cement clinker is tricalcium silicate, created a tendency by the producers of high grade portland cement to augment the contents of lime in the composition of the raw mixture to the greatest possible extent. The principle, "the highest strength will always be obtained when the raw mix has an optimum lime content," was adopted by the majority of the manufacturers. Naturally, this rule was carried too far, especially in those countries where the main aim was seen in the very high initial resistance to compressive tests, where the tests for tensile strength were of secondary importance.

### High Limed Mixtures

The high limed raw mix made the burning process more difficult, and therefore more attention had to be paid

to a careful preparation of raw material, as well as to more scientific control of production. The new product evolved new problems and a necessity of scientific work intensively supported by the manufacturers. A closer union between practice and science was created, which influenced successfully the enrichment of our knowledge of cement. However, in spite of this co-operation of practice and science the manufacturers could not avoid many false steps. In attempts to produce a rapid-hardening hydraulic binding material with high initial strength, some of them overlooked other properties.

The industrial chemist, producing high grade portland cement, worked under the suggestion of a raw mix with an optimum lime content. Of course, other factors, as "silica modulus" and the alumina-iron ratio were taken into consideration; but in respect to these two factors, the industrial chemist was very often limited by the composition of the raw materials available. And as a matter of fact, the well-known rule of Prof. Dr. H. Kuehl,<sup>7</sup> that "the highest strengths are obtained from cements very rich in silica on the one hand, and from those very low in silica on the other," was used in the practice only in a few isolated cases. The greatest part of high grade cements shows rather a middle silica modulus.

#### Lime Saturation Point

By increasing the lime content the way was less limited. The current formulae for the approximation of the "lime saturation point" in portland cement were based on the theory of the tricalcium silicate as the most important and only desirable ingredient of the lime-silica compounds. So, for example, the formula of Guttmann and Gille<sup>8</sup> indicates that the cement clinker consists of tricalcium silicate, tricalcium aluminate and monocalcium ferrite, when the cement is rich in alumina. For a high iron cement the tricalcium aluminate is replaced by dicalcium aluminate, and the monocalcium ferrite by dicalcium ferrite. The more recent formula, used by the laboratory of The Association of Portland Cement Manufacturers in Germany,<sup>9</sup> considers cement clinker as a system of  $x$  (3CaO.SiO<sub>2</sub>) +  $y$  (3CaO.Al<sub>2</sub>O<sub>3</sub>) +  $z$  (4CaO.Al<sub>2</sub>O<sub>3</sub>.Fe<sub>2</sub>O<sub>3</sub>), in case Al<sub>2</sub>O<sub>3</sub> ≥ 0.64 Fe<sub>2</sub>O<sub>3</sub>; or as a system of  $x$  (3 CaO.SiO<sub>2</sub>) +  $y$  (4CaO.Al<sub>2</sub>O<sub>3</sub>.Fe<sub>2</sub>O<sub>3</sub>) +  $z$  (2CaO.Fe<sub>2</sub>O<sub>3</sub>), in case Al<sub>2</sub>O<sub>3</sub> ≤ 0.64 Fe<sub>2</sub>O<sub>3</sub>.

The writer belonged to this relatively small group of cement specialists who denied the existence of tricalcium silicate in industrial cement clinker. He shared the point of view of E. Leduc, W. Dyckerhoff<sup>10</sup> and others, who supported the conception, that the high

saturated lime silica compounds of cement clinker consist of dicalcium silicate enriched by dissolved lime. Only a few years ago the investigations of the American scientists, especially the excellent work of L. T. Brownmiller and R. H. Bogue,<sup>11</sup> who applied the X-ray diffraction method to the study of the constitution of cement, convinced the writer that "compositions ranging between 2CaO.SiO<sub>2</sub> and 3CaO.SiO<sub>2</sub> properly heated, contain at equilibrium a mixture of 3CaO.SiO<sub>2</sub> and either or 2CaO.SiO<sub>2</sub>," and that tricalcium silicate is one of the constituents of commercial cement.

#### Low Limed Cements

The disinclination toward the assumption of the existence of tricalcium silicate helped the writer at one time to avoid the usual hunting for the highest possible lime contents, while producing high grade cement. His experience confirms that in order to obtain high early strength portland cement a very high proportion of lime is absolutely unnecessary. The writer was for many years in charge of control of manufacture at a cement plant, producing, exclusively, high early strength portland cement. This cement, in regard to its properties, its initial tensile and compressive strengths could be placed among the best world brands. It was not particularly fine ground (2% to 1% residue on the 200-mesh sieve), developed a comparatively low heat of hydration (60-65 cal/gr. . 7 days) and showed a good resistance in sea water. So, for example, concrete cubes of the size of 8x8x8 in. made of plastic mixture of 1 part of cement to 2 parts of sand to 4 parts of gravel, by weight, being cured in sea water and tested for compressive strength, showed a resistance, as follows:

after 3 days	3550 lb./in. <sup>2</sup>
after 7 days	5296 lb./in. <sup>2</sup>
after 28 days	5764 lb./in. <sup>2</sup>
after 1 year	6145 lb./in. <sup>2</sup>
after 2 years	6523 lb./in. <sup>2</sup>
after 4 years	6738 lb./in. <sup>2</sup>
after 5 years	6962 lb./in. <sup>2</sup>

The chemical composition of this cement, computed according to R. H. Bogue, was as follows:

3 CaO.SiO <sub>2</sub>	49.49%
2 CaO.SiO <sub>2</sub>	23.91%
3 CaO.Al <sub>2</sub> O <sub>3</sub>	10.39%
4 CaO.Al <sub>2</sub> O <sub>3</sub> .Fe <sub>2</sub> O <sub>3</sub>	8.98%
Mgo	1.46%
CaSO <sub>4</sub>	1.85%
CaO free	0.30%
Ignition loss	2.42%
Insoluble	0.47%
Alkalies	0.72%

The writer could give from his own practice many examples of portland cements of comparatively low contents of 3 CaO.SiO<sub>2</sub> and high initial strengths. He could also refer to portland cements of high resistance, manufactured by the

French cement industry, which was always careful in augmentation of the lime content in cement. The British cement industry, bound by the British Standard Specification, which fixes the maximum of lime in cement without taking into account the presence of iron compounds of calcium, was, in the majority of cases, especially till the year of 1932, limited in increasing to a great degree the content of lime in cement.

The portland industry of this country (United States) is rather inclined to work with high limed raw mixtures for high early strength cements. One year ago G. Rupert Gause,<sup>12</sup> of the National Bureau of Standards, published the results of an investigation of 28 different high early strength cements. The writer's attention was drawn by two characteristic properties: a high content of lime and an exclusive fineness of grinding.

The contents of tricalcium silicate varies between 44% and 74%, being on the average, 59%; the content of bicalcium silicate fluctuates between 0 and 25% giving an average of 12%. According to the investigations of Dr. G. Haegermann<sup>13</sup> of The Association of Portland Cement Manufacturers in Germany, the average content of tricalcium silicate and bicalcium silicate in the German high early strength cements equal 56.1 and 18.1% respectively. It is generally known that the German producers are partisans of a high lime content in high grade portland cement, but these results show that the American high early strength cements, in regard to the average contents of tricalcium silicate, exceed even the German ones.

#### Fine Grinding Unnecessary

The second characteristic of the American high early strength cements, is their exclusive fineness. The average of the contents of particles of the size smaller than 20  $\mu$  equals 63% and smaller than 7.5  $\mu$ , 33%. The average surface area equals 2361 cm<sup>2</sup>/g., ranging to 2860 cm<sup>2</sup>/g. The tendency of fine grinding is common everywhere, but the writer did not notice such a grade of fineness in the high early strength cements of foreign origin. The viewpoints in regard to the influence of the fineness on the strength of cement are different. The writer thinks that the best early strengths can be obtained from the fractions composed of grain of the size between 7.5 and 30  $\mu$ . It is an unnecessary waste of power to grind the clinker to a flour of a large content of particles of the size finer than 7.5  $\mu$ . This very fine powder does not increase considerably the initial strengths, but augments the heat of hydration and causes a greater contraction of mortar.

In spite of the high contents of tri-

calcium silicate and the very fine grinding, 9 of the 28 cements examined failed to meet the strength requirements of the A.S.T.M. Tentative Specification C-74-30 T at one day. The best results in regard to tensile strength at 3 days showed two brands: Nos. 5 and 24, namely, 410 lb./in.<sup>2</sup>. The two brands present cements of an intermediate content of tricalcium silicate, 55%, and are not extremely fine ground, having a surface area of 2190 and 2350 cm.<sup>2</sup>/g. Unfortunately this investigation does not include tests for the heat of hydration, and we can not see how far the high fineness and the high content of tricalcium silicate affect the increase of heat developed by hardening.

The pronounced inclination of the producers of this country to increase the amount of high saturated lime-silica compounds resulted in a certain objection to use the high early strength cement. Under these circumstances the writer was not much surprised when reading a personal view of a collaborator of an authoritative construction organization, that in order to obtain high early strength in portland cement, it is necessary to maintain a maximum percentage of tricalcium silicate in the cement, this resulting in cement which, used for structural purposes, has a high heat of hardening on the one hand, and in concrete that may be not durable on the other hand. It is possible that similar opinions influenced the appearance of the idea to classify the cement brands regarding their application according to their chemical composition.

#### Chemical Formulae

In this country, one is accustomed to calculate the composition of portland cement according to the four compounds method of R. H. Bogue. Now, after the investigations of Lea and Parker,<sup>1</sup> there may arise a proposition to change the four compounds' formula into the five compounds' one. But neither the four compounds' nor the five compounds' formula covers the ingredients of a commercial cement. The liquids, formed at the sintering temperature, fail to crystallize, and microscopic examination shows the presence of "glass," sometimes in considerable quantities. We also do not know in what compounds the alkalies are present. Unless the nature of these ingredients is established, all the formulae for determination of cement will possess an element of uncertainty. Therefore the writer does not see any practical value in a modification of R. H. Bogue's method for calculation of the compounds of portland cement. It seems to him that the four compounds' method is the most simple and accurate one in obtaining valuable comparative results,

and that at the present time our knowledge of other components is so little that the introduction of new factors in this formula will bring only unnecessary complications. And the writer denies that a formula which is based on chemical composition of cement can predict its properties exactly. It occurs that two brands of different cement plants, of identical chemical composition, in regard to the contents of oxides, can largely differ in their properties as hydraulic hardening materials. The recently published investigations of J. Arthur Swenson and E. P. Flint<sup>2</sup> of the National Bureau of Standards show that "no satisfactory correlations were found between the calculated composition and the heats of hydration."

Regarding high early strength portland cements, the writer wishes to point out once more, that in order to produce them, it is not necessary to work with high limed raw mixtures. On the contrary, better results are obtained with raw mixtures of intermediate lime contents. The formulae for lime saturation do not comply with the conditions of the commercial production of cement. The chemical and physical properties of the raw materials, the system of burning and cooling, the kind of fuel and other factors challenge the industrial chemist to find his own way to choose the best possible composition, without being too much influenced by a fixed formula. The high early strength cement should be considered not as a special binding material for a special purpose. It is a very carefully prepared portland cement, that should be high not only in respect to its initial strengths, but also be high in respect to other properties. Of course, nobody can expect from it a hydraulic hardening material for all purposes, but a correctly prepared high early strength portland cement can fully comply with all the requirements for a material for reinforced concrete, as well as for road building and for mass construction work.

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- (2) H. Kuehl. Cement Chemistry in Theory and Practice. Page 45.
- (3) Zement. 18, 571 (1929).
- (4) Zement. Page 269 (1933).
- (5) Dr. W. Dyckerhoff. Ueber den Verlauf der Mineralbildung beim Erhitzen von Gemengen aus Kalk Kieselsozere und Tonerde. Leipzig, 1925.
- (6) National Bureau of Standards. Journal of Research R. P. 223, Oct. 1930.
- (7) National Bureau of Standards. Journal of Research R. P. 839, Oct. 1935.
- (8) Zement. Page 269 (1933).
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#### Planning Improvements

AETNA PORTLAND CEMENT CO., Bay City, Mich., is planning improvements to its power house, including coal-burning equipment, conveyors, bins, etc. S. Firestone, Rochester, N. Y., is engineer in charge.

#### Opposes Cut in Cement Rates

PORT AUTHORITY of Boston, Mass., is opposing a proposed cut in freight rates into Boston area on portland cement, designed to permit domestic manufacturers to meet foreign competition. In a brief filed with the Interstate Commerce Commission in behalf of the port authority, by W. W. McCoubrey, commerce assistant, it was argued that cutting of the rates would in effect nullify the effect of the trade agreement between the United States and Belgium "as well as agreements with other countries which were entered into with due consideration to possible adverse effects upon any domestic industry."

#### Broadens Business

ROCKFORD STONE AND FERTILIZER CO., Rockford, Ohio, which has been making pulverized limestone at a plant northwest of the town, is building a large warehouse on the Cincinnati Northern R.R., near the Rockford Lumber Co. plant, and will handle commercial fertilizers as well as agricultural limestone.

#### New Racket

OKLAHOMA racketeers hit on a new one recently. The Oklahoma Portland Cement Co. powder magazine, at Lawrence, Okla., was broken into some time ago and 63 boxes of dynamite stolen. Recently police recovered 53 boxes the racketeers were attempting to deliver to a quarry in the same locality.

#### Where Was Life Belt?

SIGNAL MOUNTAIN PORTLAND CEMENT CO., Chattanooga, Tenn., suffered a fatal accident to a 20-year-old employee on January 5. He is reported to have been working over the primary crusher on an oiling job when he lost his footing and fell head first into the crusher. Life belts are in general use by employees feeding a crusher; probably their use should be extended to those who have work to do over them, while in operation. However, it may not have been feasible in this case.

## Production Statistics

PORTLAND CEMENT industry in December, 1936, produced 8,971,000 bbl., shipped 6,246,000, and had in stock at the end of the month 22,842,000. Production and shipments showed increases of 54.6 and 38.4%, respectively, as compared with December, 1935. Stocks at mills were 0.5% lower than a year ago. The preliminary totals of production and shipments for 1936 show increases, respectively of 45.7 and 48.8% over the final totals for 1935.

The statistics here given are compiled from reports for December, received by the Bureau of Mines, from all manufacturing plants except two, for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 160 plants at the close of December, 1936, and of 163 plants at the close of December, 1935.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY					
	December	Nov.	Oct.	Sept.	
	1935	1936	1936	1936	1936
The month.	25.6	40.3	50.9	56.0	57.1
12 months ended ...	28.6	42.7	41.5	40.0	38.1

## To Spend Quarter Million

CALAVERAS CEMENT Co., San Francisco, Calif., has a plant improvement program at San Andreas, Calif., for 1937, calling for the expenditure of \$250,000. New equipment includes a \$110,000 Cottrell precipitator, or dust collector, which the company started installing in December, as well as a new grinding unit for finished cement and a Smith dense chain system for the No. 2 kiln, which is expected to effect important fuel economies. A similar system has proven highly satisfactory on the No. 1 kiln. Together with plant and property improvement made during 1936, Calaveras Cement's 1937 program will give the company a greatly increased production capacity and improved operating efficiency, expected to result in lower unit operating expenses. During 1936 the company built a 6-mile haulage road connecting the plant with the high lime quarry; purchased a new 75 B type shovel; and installed Hammer screens in the raw mills, which have effected increased production capacity for that department.

## Suspends Production

MONOLITH PORTLAND MIDWEST Co., Laramie, Wyo., suspended operations for the usual seasonal repairs on December 15. Production was expected to be resumed about February 15; meanwhile shipments continue from stock.

## New Works Manager

UNITED STATES GYPSUM Co., Chicago, Ill., has appointed O. W. Frost, former superintendent of the Wood Conversion Co., Duluth, Minn., works manager of its Greenville, Miss., wood-pulp board plant. He succeeds J. R. Newberry who has been promoted to be production manager of all the company's insulation board mills, with headquarters in Chicago.

## Safety Record

DIAMOND PORTLAND CEMENT Co., Middle Branch, Ohio, recently gave a dinner for 150 employees of the plant, in recognition of their record of working four years without a lost-time accident. P. V. Waddell, representative of the industrial commission of Ohio, was the guest speaker. R. D. Raff, vice-president of the company, addressed the men and distributed bonus checks.

## New Plant

GULF PORTLAND CEMENT Co., Fort Worth, Tex., will build a portland cement plant of 1000 bbl. daily capacity on Houston ship channel, Houston, Tex., on property leased for 50 years from the Southern Pacific Lines. The company is a new one, said to be a closed corporation owned by three Texas business men. Kent B. Diehl, former field engineer for the Dewey Portland Cement Co., Kansas City, Mo., is president of the new company; Harper Holt is vice-president; Tom B. Douglas, former engineer with the Dewey Portland Cement Co., Kansas City, Mo., will be plant manager at Houston. It is said the company proposes to erect similar small plants in other localities. The Houston plant is expected to cost about \$400,000. It will contain one 8-x220-ft. rotary kiln, a 6-x60-ft. cooler, 5-x22-ft. tube mills, six 12-ft. diameter by 28-ft. blending tanks and one 20 ft.x28 ft., a

No. 85 Kominuter, a Type B Jeffrey hammer mill, five reinforced-concrete silos. Automatic weighing devices will be used to proportion the raw materials, which will be oyster shells and clay. Considerable of the equipment, according to local news reports, is being taken from the old Cherokee Portland Cement Co. plant, Hartshorne, Okla., which was closed in 1921.

## Contract Let

UNIVERSAL ATLAS CEMENT Co., Chicago, Ill., has let a contract for the construction of reinforced - concrete silos at its Leeds, Ala., plant to Nicker- son & Co., New York City. There are to be 12 silos with 6 interstice compartments, increasing present storage facilities more than 80%—a total capacity for 120,000 bbl. will be available.

## Promotions

NORTH AMERICAN CEMENT CORP., New York City, through Thomas J. Harte, vice-president, announces the following appointments: Roy S. Adkins, general sales manager, New York City; Wm. C. Brownson, assistant general sales manager, cement division; Albert R. Couchman, assistant general sales manager, lime and other products division.

## Lime Shipments Up 27 Per Cent in 1936

SHIPMENTS OF LIME in the United States, according to preliminary figures furnished the Bureau of Mines by producers, comprising about 70% of the industry, increased approximately 27% as compared with the previous year, though still 17% less than the peak year, 1925. The total shipments thus indicated amounted to 3,783,000 short tons valued at \$27,464,000. Prices of lime were fairly steady throughout 1936, averaging \$7.26 in 1936 against \$7.28 in 1935.

LIME SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1935 AND 1936 (PRELIMINARY), BY USES

Use	1935		1936 (preliminary)	
	Quantity	Value	Quantity	Value
Agricultural .....	282,660	\$1,901,839	315,000	\$2,128,000
Building .....	656,894	5,716,802	923,000	7,992,000
Metallurgy .....	452,759	2,737,419	1,988,000	12,651,000
Chemical .....	1,139,562	7,806,761	557,000	4,693,000
Refractory .....	455,258	3,785,834		
	2,987,133	21,748,655	3,783,000	27,464,000

HYDRATED LIME SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1935 AND 1936 (PRELIMINARY), BY USES

Use	1935		1936 (preliminary)	
	Quantity	Value	Quantity	Value
Agricultural .....	197,717	\$1,437,236	221,000	\$1,610,000
Building .....	471,061	3,977,204	645,000	5,512,000
Chemical .....	336,851	2,525,073	350,000	2,578,000
	1,005,619	7,939,513	1,216,000	9,700,000

# HINTS AND HELPS FOR SUPERINTENDENTS

## Picking Clay Balls at 1200-Ton Plant

By C. O. GRANGER,  
Superintendent, Chas. H. Young Co., St. Paul, Minn.

**W**HEN sand and gravel are mixed speed it is almost impossible to pick out clay balls. We have tried many ways and the following proved best.

By chuting material from the washing screen on to a conveyor traveling 60 to 80 ft. per min., we found one man could hand pick a lot of gravel and do a fine job. This picking conveyor, 40 in. wide and 16 ft. long, has low side boards to keep material from rolling off.

To get speed reduction we used chains and sprockets; and to get a reverse, in order that conveyor could discharge from either end into bins, we used an old motor car transmission.

Samples for inspection are usually taken from the end of loading chutes where material coming from the bins is segregated. Because of this, on one job we had to waste 3 to 5% of  $\frac{1}{2}$ -in. and smaller material in order that gravel would pass inspection. We knew from previous experience that there was no need of this waste, and after taking samples from the end of picking conveyor where there is no segregation, material passed inspection without wasting fines.

## Home-Made Car Puller

By ROBT. A. HARKER,  
Santa Cruz, Calif.

**O**UR original car-puller was an old steam hoist which we operated with air. This hoist would not pull the required loads. It was decided to convert the existing puller to use electric power.

The first step was to obtain a combination of gears to give the required line speed of about 50 ft. per min. in conjunction with an approved motor. The motor recommended by the General Electric Co. was a Type KR-284 totally enclosed 5-hp. 900/700 r.p.m. All the old gears were used, it being necessary to purchase only two new gears for the motor drive.

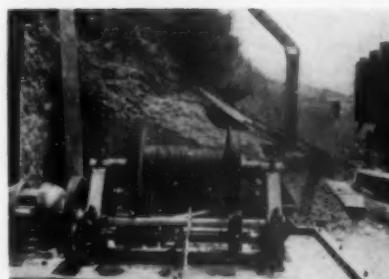
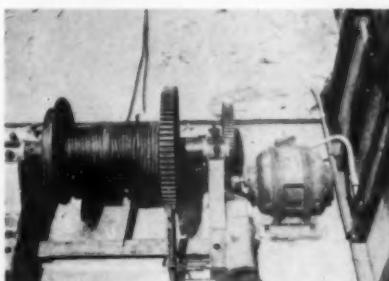
The gear ratios are shown in the accompanying diagram and are as follows: Motor gear 15-tooth to 92-tooth on first shaft; first shaft 14 to 27 on second shaft; second shaft 22 to 75 on drum shaft. This gives a drum shaft speed of 22.3 r.p.m., or a line speed averaging very close to 50 ft. per min.

The 22-tooth gear on the second shaft was bored out to fit over the hub of a Link-Belt No. 5 square jaw clutch

*Chuting material from washing screen on to a wide, slow-moving conveyor allows hand picking of gravel*

to permit rapid hand unspooling of the wire rope line. All the shafts in this particular case are  $1\frac{5}{16}$  in.

It was necessary to remove the old cranks and cross-heads, as well as torch

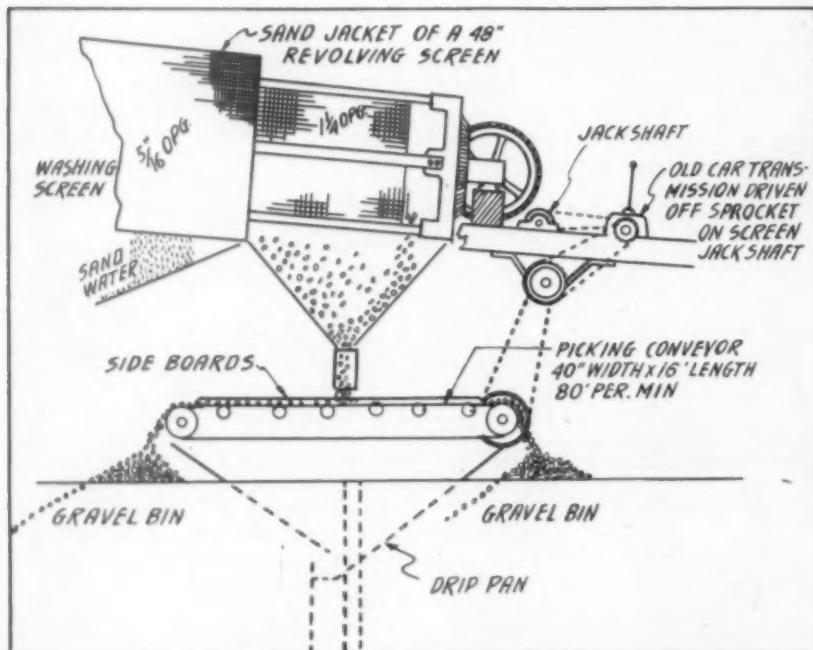


Views of the fair-lead, and, below, of the hoist, speed-reducer and motor arrangement for car puller

cut off a portion of one cross-head guide to install the motor.

The first problem encountered was the back lash on the cable after the power was cut, which caused the spool to unwind and then the respooling was very irregular. After trying a number of automatic brakes it was decided to try a differential back stop brake similar to the Link-Belt differential back stop used to prevent elevators from reversing when the power is cut off. This solved the problem admirably.

A sketch showing how this brake is hooked up will be found on the diagram. The views show several features of the



installation including the jaw clutch and the system of gears. The back stop brake was installed after the photos were taken and the unit housed in.

The assembly is bolted to a reinforced-concrete block 3 ft. deep. This puller will handle 5 steel gondolas with 60-ton loads on approximately level track.

One view shows the fair leader for the wire rope which was constructed of old  $3\frac{1}{2}$ -in. shafts cut to length and bored for axles. The axles are held in a box of  $\frac{3}{8}$ -in. plate and anchored with lag screws and shields to an old concrete "dead man". There are two vertical and one horizontal rollers.

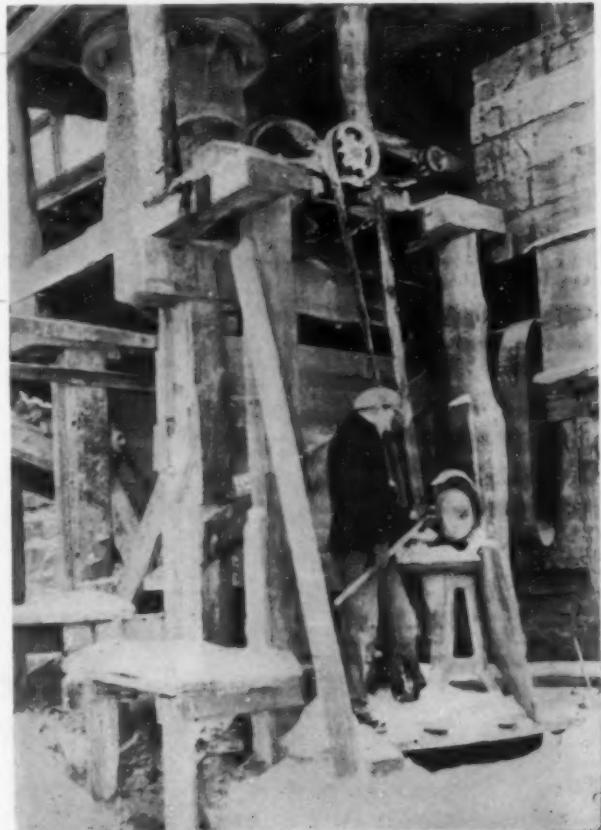
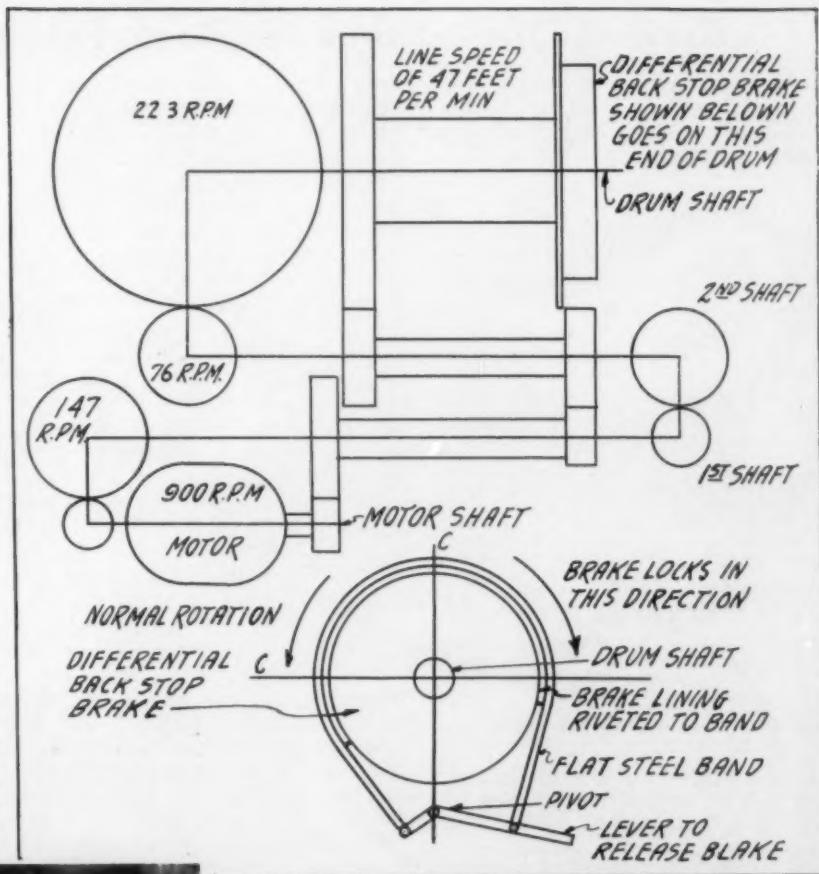
The puller has a remote control G-E. pendant push-button connected with a magnetic line starter.

### Sharpening Removable Rock Bits at Small Plant

By ROSS WHEELTON,  
Aldershot, Ont.

**S**INCE the inception of removable rock bits a few years ago, many plant operators have adopted them with very satisfactory results from the standpoint of reduced drilling costs.

When rock drilling is done on a small scale, the employment of a blacksmith to sharpen drill steel is not warranted, and sending the steel to an outside shop



ABOVE — Gear ratios and brake hook-up used in converting pulley to electric power

LEFT — V-faced grinding wheel, driven from an extra pulley on end of a crusher countershaft, sharpens removable rock bits

is not usually very satisfactory, because delays occur, often tying up operations. The removable bits eliminate much of this trouble, but many operators do not grind their own bits and are, therefore, not making the most of the advantages offered by their use.

A grinding wheel can be obtained from the abrasive manufacturers with a V-face specially designed to put the proper cutting edge on removable rock bits, and it can be fitted to any simple grinding machine that may be available around the plant.

The view herewith shows one of these grinders in use, being driven from an extra pulley on the end of a crusher countershaft. Around the machines in most plants many places can be found where a power take-off can be arranged.

Very often when reliance is made on outside sharpening, the proper size bit is not available when needed, and this will influence the driller to use the same size bit to sink two lengths of steel instead of reducing the size of bit used on the second steel.

The bits can be touched up occasionally keeping them always sharp instead of letting them go until they are too dull, as is usually the case when they are sent out for sharpening.

# Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividends	Stock	Date	Bid	Asked	Dividends
Allentown P. C. (Penn.), com. <sup>50</sup> ...	1-29-37	8	..		Missouri P. C. ....	1-29-37	23 1/2	25	.75 Dec. 15
Allentown P. C., pfd. <sup>50</sup> .....	1-29-37	10	..		Monarch Cement, com. <sup>50</sup> .....	1-29-37	9 1/2	..	6% Jan. 15
Alpha P. C., com.....	1-29-37	39 1/2	39 1/2	.25 (qu.) Mar. 25	Monolith P. C., com. <sup>50</sup> .....	1-18-37	3	3 1/2	..
American Aggregates, 1st mtg. 3/8's, 1943, new bonds <sup>48</sup> .....	1-29-37	50	..	Monolith P. C., 8% pfd. <sup>50</sup> .....	1-18-37	7	8	..	
American Aggregates, 6% 1943, old <sup>48</sup> .....	1-29-37	50	..	Monolith P. C., units <sup>50</sup> .....	1-18-37	17	19 1/2	..	
American Aggregates, pfd. <sup>48</sup> .....	1-29-37	6	..	Monolith P. C., 1st mtg. <sup>50</sup> .....	1-18-37	104	105 1/2	..	
Arundel Corp., com.....	1-29-37	118 1/2	..	Monolith Portland Midwest, pfd. <sup>50</sup> .....	1-18-37	2 1/2	3	..	
Ash Grove L. & P. C., com. <sup>50</sup> .....	1-29-37	11	..						
Ash Grove L. & P. C., pfd. <sup>50</sup> .....	1-29-37	160	..						
Bessemer L. & C., cert. of dep., 1947 <sup>48</sup> .....	1-19-37	94 1/2	95 1/2		National Gypsum, A. com.....	1-13-37	66	66 1/2	
Bessemer L. & C., com. <sup>48</sup> .....	1-20-37	10 1/2	..	National Gypsum, 1st pfd. ....	1-13-37	103 1/2	104 1/2		
Bessemer L. & C., pfd. <sup>48</sup> .....	1-20-37	40	..	National L. & M. 6 1/2's, 1941 <sup>48</sup> .....	1-19-37	15 1/2	..		
Bessemer L. & C., 6 1/2's, 1955 <sup>48</sup> .....	1-29-37	95	..	Nazareth Cement, Com. <sup>50</sup> .....	1-29-37	18	13		
Bessemer L. & C., 1st 6 1/2's, 1947 <sup>48</sup> .....	1-20-37	95	..	Nazareth Cement, pfd. <sup>50</sup> .....	1-29-37	99	..		
Boston S. & G., com. <sup>50</sup> .....	1-20-37	1 1/2	2 1/2	New England Lime, units <sup>48</sup> .....	1-19-37	15	..		
Boston S. & G., 7% pfd. <sup>50</sup> .....	1-20-37	11 1/2	13 1/2	N. Y. Trap Rock, 1st 6's, 1946.....	1-29-37	94 1/2	94 1/2		
Boston S. & G., 7%, 1939 <sup>48</sup> .....	1-20-37	75	..	N. Y. Trap Rock, 6's, stamped, 1946.....	1-29-37	94 1/2	98		
Calaveras Cement, com. <sup>48</sup> .....	1-15-37	9 1/2	9 1/2	N. Y. Trap Rock, 7% pfd. <sup>48</sup> .....	1-19-37	75	..		
Calaveras Cement, 7% pfd. <sup>48</sup> .....	1-15-37	105	..	North Amer. Cement, 1st 6 1/2's, 1953.....	1-18-37	56 1/2	58 1/2		
California Art Tile, A <sup>48</sup> .....	1-18-37	21 1/2	22 1/2	North Amer. Cement, 6 1/2's, 1943.....	1-18-37	108	102		
California Art Tile, B <sup>48</sup> .....	1-18-37	3	4	North Amer. Cement, 1st 6 1/2's, 1949 <sup>48</sup> .....	1-29-37	81	..		
Canada Cement, com. <sup>48</sup> .....	1-21-37	15	15 1/2	North Amer. Cement, "A" pfd. ....	1-18-37	14 1/2	16		
Canada Cement, pfd. <sup>48</sup> .....	1-21-37	104	..	North American Cement "B" pfd. ....	1-18-37	13 1/2	16 1/2		
Canada Cement, 4 1/2's, 1961 <sup>48</sup> .....	1-21-37	104 1/2	..	North Amer. Cement, com.....	1-18-37	7 1/2	9		
Canada Crushed Stone, 5 1/2's, 1944 <sup>48</sup> .....	1-21-37	99	..	North Shore Mat, 1st 6's <sup>48</sup> .....	1-29-37	68	..		
Consolidated Cement, 1st 6's, 1950 <sup>48</sup> .....	1-29-37	90	92	Northwestern P. C., units <sup>50</sup> .....	1-18-37	55	..		
Consolidated Cement, 6 1/2's, 1948 <sup>48</sup> .....	1-29-37	12 1/2	13 1/2	Northwestern States P. C. <sup>50</sup> .....	1-29-37	27	29		
Consolidated Oka R. & G., 6 1/2's, 1948 <sup>48</sup> .....	1-21-37	19	..						
Consolidated R. & G., pfd. <sup>50</sup> .....	1-29-37	47	..						
Consolidated Rock Products, units <sup>50</sup> .....	1-29-37	40c	80c						
Consumers Rock & Gravel, 1st mtg. 6 1/2's, 1948 <sup>48</sup> .....	12-31-36	35	36						
Cossa P. C., 1st 6's <sup>50</sup> .....	12-31-36	42	..						
Coplay Cement Mfg., pfd. <sup>50</sup> .....	1-29-37	15	..						
Coplay Cement Mfg., 6's, 1941 <sup>48</sup> .....	1-29-37	91	..						
Cumberland P. C., T's, 1937 <sup>48</sup> .....	1-29-37	100 1/2	..						
Deweys P. C., com. <sup>50</sup> .....	12-31-36	56	..						
Dolese & Shepard.....	1-29-37	41	..						
Federal P. C., 6 1/2's, 1941 <sup>48</sup> .....	1-20-37	58	..						
Fla. P. C., units <sup>50</sup> .....	1-29-37	46	48						
Fla. P. C., 6 1/2's, 1937 <sup>48</sup> .....	1-19-37	100 1/2	101 1/2						
Giant P. C., com. <sup>50</sup> .....	1-29-37	6 1/2	7 1/2						
Giant P. C., pfd. <sup>50</sup> .....	1-29-37	27	29						
Gyp. Lime & Alabastine.....	1-13-37	16 1/2	17 1/2						
Gyp. Lime & Alabastine, 5 1/2's, 1948 <sup>48</sup> .....	1-29-37	102 1/2	103 1/2						
Hawkeye P. C., cap <sup>50</sup> .....	12-31-36	32	38						
Hercules Cement, com. <sup>50</sup> .....	1-29-37	38 1/2	..						
Hercules Cement, pfd. <sup>50</sup> .....	1-29-37	80	..						
Hermitage Portland Cement, com. <sup>50</sup> .....	1-29-37	22	..						
Hemitzite Portland Cement, pfd. <sup>50</sup> .....	1-29-37	110	..						
Ideal Cement, com.....	1-29-37	90	93						
International Cement, conv. deb. 4's, 1945 .....	1-29-37	162	actual sale						
(Called for redemption at 103 plus accrued Interest, February 11, 1937.)									
Keller Island L. & T.....	1-29-37	25 1/2	26 1/2						
Ky. Cons. Stone, 6 1/2's, 1938 <sup>48</sup> .....	12-31-36	15	17						
Ky. Cons. Stone, com. <sup>50</sup> .....	12-31-36	3 1/2	5						
Ky. Cons. Stone, 1st mtg., 6 1/2's <sup>48</sup> .....	1-19-37	19	..						
Ky. Rock Asphalt, 6 1/2's, 1936 <sup>48</sup> .....	1-19-37	33	..						
Lawrence P. C., com.....	1-16-37	40	41 1/2						
Lawrence P. C., 5 1/2's, 1942 <sup>48</sup> .....	1-29-37	161	161 1/2						
Lehigh P. C., com.....	1-8-37	40 1/2	41 1/2						
Lone Star Cement, com.....	1-29-37	162	163						
Louisville Cement .....	12-30-36	120	..						
Lyman-Richey, 1st 7's, 1935 <sup>48</sup> .....	12-21-36	56	..						
Marblelite Corp., com. <sup>48</sup> .....	1-15-37	250	1						
Marblelite Corp., pfd. <sup>48</sup> .....	1-15-37	4	5						
Marblehead Lime, T's, 1944 <sup>48</sup> .....	1-19-37	96	98						
Marquette Cement, com.....	1-29-37	49	52						
Mesquite Cement, pfd. <sup>50</sup> .....	1-29-37	98 1/2	..						
Material Service Corp. <sup>50</sup> .....	1-29-37	18	20						
McCrary-Rodgers, 7% pfd. <sup>50</sup> .....	1-29-37	7	9						
Medusa P. C., com.....	1-29-37	46	45						
Medusa P. C., pfd. <sup>50</sup> .....	1-29-37	50	51						
Michigan L. and C., com. <sup>50</sup> .....	1-29-37	40	..						
Minnesota Mining & Mfg. Co.....	1-23-37	39 1/2	actual sale						
				2.50 (resm.) Dec. 15					
Missouri P. C. ....	1-29-37	23 1/2	25						
Monarch Cement, com. <sup>50</sup> .....	1-29-37	9 1/2	..						
Monolith P. C., com. <sup>50</sup> .....	1-18-37	3	..						
Monolith P. C., 8% pfd. <sup>50</sup> .....	1-18-37	7	8						
Monolith P. C., units <sup>50</sup> .....	1-18-37	17	..						
Monolith P. C., 1st mtg. <sup>50</sup> .....	1-18-37	104	105 1/2						
Monolith Portland Midwest, pfd. <sup>50</sup> .....	1-18-37	2 1/2	3						
National Gypsum, A. com.....	1-13-37	66	66 1/2						
National Gypsum, 1st pfd. ....	1-13-37	103 1/2	104 1/2						
National L. & M. 6 1/2's, 1941 <sup>48</sup> .....	1-19-37	15 1/2	..						
Nazareth Cement, Com. <sup>50</sup> .....	1-29-37	18	13						
Nazareth Cement, pfd. <sup>50</sup> .....	1-29-37	99	..						
New England Lime, units <sup>48</sup> .....	1-19-37	15	..						
N. Y. Trap Rock, 1st 6's, 1946.....	1-29-37	94 1/2	94 1/2						
N. Y. Trap Rock, 6's, stamped, 1946.....	1-29-37	94 1/2	98						
N. Y. Trap Rock, 7% pfd. <sup>48</sup> .....	1-19-37	75	..						
North Amer. Cement, 1st 6 1/2's, 1953.....	1-18-37	56 1/2	58 1/2						
North Amer. Cement, 6 1/2's, 1943.....	1-18-37	108	102						
North Amer. Cement, 6 1/2's, 1949 <sup>48</sup> .....	1-29-37	81	..						
North Amer. Cement, "A" pfd. ....	1-18-37	14 1/2	16						
North American Cement "B" pfd. ....	1-18-37	13 1/2	16 1/2						
North American Cement, com.....	1-18-37	7 1/2	9						
North Shore Mat, 1st 6's <sup>48</sup> .....	1-29-37	68	..						
Northwestern P. C., units <sup>50</sup> .....	1-18-37	55	..						
Northwestern States P. C. <sup>50</sup> .....	1-29-37	27	29						
Ohio River S. & G., com. <sup>50</sup> .....	12-31-36	1	..						
Ohio River S. & G., 1st pfd. <sup>50</sup> .....	12-31-36	7 1/2	..						
Ohio River S. & G., 2nd pfd. <sup>50</sup> .....	12-31-36	4	..						
Ohio River S. & G., 6 1/2's, 1941 <sup>48</sup> .....	1-19-37	9	11						
Oregon P. C., com.....	1-15-37	3 1/2	4 1/2						
Oregon P. C., pfd. <sup>50</sup> .....	1-15-37	97	..						
Oregon P. C., conv. pfd. <sup>50</sup> .....	1-15-37	55	57						
Pacific Coast Agric. new com. <sup>48</sup> .....	1-15-37	3 1/2	3 1/2						
Pacific P. C., com. <sup>48</sup> .....	1-15-37	6 1/2	7 1/2						
Pacific P. C., pfd. <sup>48</sup> .....	1-15-37	56 1/2	57 1/2						
Pearless Cement, com <sup>50</sup> .....	1-29-37	9	9 1/2						
Penn-Dixie Cement, com.....	1-18-37	11 1/2	11 1/2						
Penn-Dixie Cement, 6's, A, 1941.....	1-29-37	72 1/2	74						
Penn-Dixie Glass Sand Corp., v.t.c. ....	1-29-37	101 1/2	actual sale						
Penn. Glass Sand Corp., 1st Mtg. 4 1/2's, 1950.....	1-29-37	105 1/2	105 1/2						
Petoskey P. C., 6's, 1935-39 <sup>48</sup> .....	1-20-37	100	..						
Petoskey P. C., 6's, 1941 <sup>48</sup> .....	1-20-37	100	..						
Petoskey P. C., com. <sup>50</sup> .....	1-20-37	12	13						
Republic P. C., 6's, 1943 <sup>48</sup> .....	1-29-37	103	..						
Riverside Cement, A <sup>48</sup> .....	1-18-37	16	17						
Riverside Cement, B <sup>48</sup> .....	1-18-37	2	2 1/2						
Riverside Cement, pfd. <sup>48</sup> .....	1-18-37	99	101						
Rockland & Rockport Lime, new com. <sup>50</sup> .....	1-29-37	1	..						
Standard Pav. & Mat. (Can.), com. <sup>50</sup> .....	1-21-37	8	8 1/4						
Standard Pav. & Mat., pfd. <sup>48</sup> .....	1-21-37	54	55						
Superior P. C., A <sup>48</sup> .....	1-15-37	46	47 1/2						
Superior P. C., B <sup>48</sup> .....	1-15-37	19	..						
Trinity P. C., units <sup>50</sup> .....	1-29-37	50	55						
Volunteer P. C., 1st 7's, 1942 <sup>48</sup> .....	1-19-37	100	..						
Volunteer P. C., com. <sup>50</sup> .....	1-19-37	3 1/2	..						
Volunteer P. C., 7% cum. pfd. ....	1-19-37	shares sold at auction in Knoxville, Tenn., Dec. 28, at \$92.50 per share—the highest price ever paid for this stock—by C. O. Carpenter, receiver for the old Holston-Union National Bank.	..						
Vulcanite P. C., com. <sup>50</sup> .....	1-20-37	10	..						
Vulcanite P. C., 7 1/2's, 1943 <sup>48</sup> .....	1-19-37	98	92						
Wabash P. C. <sup>50</sup> .....	1-29-37	9 1/2	11						
Warner Co., wv. 1st 6's, 1944 <sup>48</sup> .....	1-19-37	93	..						

## Recent Dividends Announced

Alpha P. C., com.....	\$0.25	Mar. 25, 1937
Canada Cement, pfd.		
(accum.) .....	1.00	Mar. 20, 1937
This leaves arrears of		
	\$29.87 1/2.	
Lehigh P. C. (quar.) ...	.37 1/2	Feb. 1, 1937
Medusa P. C., com.		
(resumed) .....	2.50	Dec. 15, 1936
Missouri P. C. (extra) .....	.75	Dec. 15, 1936
Monarch Cement .....	.6%	Jan. 15, 1937
Pacific Coast Aggregates, com. (init.) .....	.05	Dec. 24, 1936
Riverside Cement Co., 1st pfd. (quar.) .....	1.50	Feb. 1, 1937
Santa Cruz P. C., cap. ....	1.00	Dec. 23, 1936
Signal Mt. P. C., 8% pfd. (accum.) .....	5.00	Dec. 15, 1936
(This leaves arrears of \$61 a share)		

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CANADA CEMENT CO., LTD., Montreal, Que., reports for the fiscal years ended November 30:

(Canadian currency):	1936	1935
*Operating profit .....	\$2,940,180	\$2,193,151
Depreciation .....	1,027,829	1,000,000
Salaries and fees .....	132,425	76,315
Balance .....	1,779,926	1,116,836
Bond interest .....	929,435	1,038,913
Mortgage interest .....	41,250	—
Income taxes .....	146,000	19,470
Bonds, premium .....	—	20,759
Net income .....	663,241	37,683
Previous surplus .....	1,035,647	945,295
Prior year adjust. (cr.) .....	16,139	52,659
Surplus, November 30 .....	1,715,027	1,035,647
Times interest earned .....	1.92	1.07
Earned per share, pref. ....	\$3.30	\$0.19
"Including investment income: 1936, \$109,273; 1935, \$178,141.		

Current assets on November 30, 1936, were \$3,885,270; current liabilities \$656,313.

The annual report of the president, J. D. Johnson, said: "The general improvement in business conditions in Canada during 1936 was reflected to some degree in the building industry, resulting in an increase in cement consumption over 1935. It may be stated, however, that the building industry is still far from normal for this country. Building and engineering permits for 1936 were only 43 1/2% of 1926, and 28% of 1929. There is encouragement in the fact that a perceptible upturn took place in private building, the first real sign of a revival in private construction since the commencement of the depression. Canada still lags far behind nearly every other country in the world in building activity, but a gradual improvement is looked for in this connection."

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AMERICAN ROCK WOOL CORP., Wabash, Ind., has filed a registration statement covering 800 shares of \$500 par value 5% cumulative convertible preferred stock and 1,000 shares (no par) class B common stock. Of the stock being registered not more than 1,000 shares of class B common and convertible preferred combined will ever become outstanding at one time, it is stated. The company will offer 300 shares of preferred stock to certain building material dealers and the remaining 500 shares of preferred are not presently to be

offered. Of the class B stock being registered, 200 shares are to be offered to officers, directors, stockholders and employees, and the remaining 800 shares are reserved for conversion of the preferred stock. The proceeds are to be used for the erecting and equipment of a plant, and to discharge indebtedness, and for working capital. The company states that the stock not presently to be offered will be held unissued until further expansion of plant facilities is necessary. Michael Luery, Wabash, is president.

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SUPERIOR PORTLAND CEMENT, INC., Seattle, Wash., established a new high annual record output of 1,640,000 bbl. for the year ended December 31, 1936. Production for the year was more than 200% above the 1935 output of roundly 524,000 bbl., Edwin P. Lucas, president, told stockholders at the company's annual meeting. Unfilled orders for Coulee dam cement on hand at December 31, 1936, amounted to about 1,450,000 bbl.

Net operating profit after depletion and depreciation, but before provision for federal income taxes and surtaxes, is reported at about \$554,000. Dividends paid during the year amounted to \$496,584, or \$6.60 a share on 75,240 outstanding shares of Class A stock. Dividend payments during the year cleared arrearage on the A stock and placed Class B stock in position to receive payments during 1937, if earnings warrant. The junior issue shares equally with A stock in dividends after payment of \$3.30 a share to A and \$1.50 a share to B stock.

The company spent \$120,000 for plant improvements during 1936, resulting in an increase in capacity of 100,000 bbl. annually. Indicated 1936 production was slightly better than 50% of capacity.

Prospects for 1937 were reported as excellent. The backlog of Coulee business will probably be delivered almost entirely during 1937 and the company reported an increase of 35% in non-Government business for 1936.

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SCHUMACHER WALL BOARD CORP., Los Angeles, Calif., reports for the three months ended October 31, 1936, net profit of \$13,182 after all charges including provision for normal federal income taxes, equal to approximately 44¢ a share on 29,410 shares of no par \$2 cumulative preferred stock which on October 31, 1936, had an arrearage of \$8.50 a share. This compares with net profit of \$10,763 or 36¢ a share on the preferred stock in the preceding three months, and with \$10,873 or 36 cents a share on preferred for the three months ended October 31, 1935.

Net profit for the six months ended October 31, 1936, as indicated by quarterly statements, amounted to \$23,945, equal to approximately 81¢ a share on the preferred stock, compared with net profit of \$19,942 or 67¢ a preferred share for the corresponding period of 1936.

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PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., reported for the three and nine months' periods ending October 1, 1936:

	3 mos.	9 mos.
Sales revenue .....	\$389,605	\$864,177
Costs and operating expense .....	262,925	602,354
Selling and administration expense .....	40,266	114,098
Depletion .....	5,518	15,512
Depreciation .....	36,420	106,269
Subsidiaries loss .....	(cr) 690	7,922
Operating profit .....	45,166	18,022
Other income (net) .....	6,707	21,275
Total income .....	51,873	39,297
Other deductions (net) .....	5,931	18,284
Net income .....	*45,941	21,011
Earned per share .....	\$0.08	\$0.04

Number of shares, 554,587.

\*Does not give the effect to entries adjusting company's investment in Kern Rock Co., Ltd.

Note: No mention made in above report of any provision for Federal surtax on undistributed profits.

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CONSOLIDATED CEMENT CORP., Chicago, Ill., reports earnings for the 12 months ended September 30 as follows:

Net sales .....	\$1,360,277
Cost of sales .....	794,247
*Selling and administration expense, etc. ....	327,761
Operating profit .....	238,268
Bond and note interest .....	119,666
Bond discount and expense .....	11,527
Loss on assets retired, etc. ....	7,254
*Net income .....	99,821
Times charges earned .....	1.82
Earned per share, class A .....	\$0.99

Number of class A shares, 100,617.

\*Including expense applicable to non-operating periods (less miscellaneous income).

+After depreciation and depletion of \$149,996.

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YOSEMITE PORTLAND CEMENT Co., Merced, Calif., has been granted a permit by the California corporation commissioner to undertake its requested capital reorganization plan. The company had asked permission to issue a new preferred stock to be exchanged for outstanding class A shares and dividend arrearage, to pay off arrearage on unconverted A stock from a portion of total dividend distributions and to reduce par value of class B stock from \$10 to \$1 a share.

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STANDARD SILICA Co., Chicago, Ill., reports for the six months ending June 30, 1936:

Net sales .....	\$169,252
Cost of sales .....	116,647
Selling and administrative expenses .....	15,432
Other deductions (net) .....	6,010
Federal income taxes .....	4,986
Net profit .....	26,177
Earned per share, common .....	\$0.67

The balance sheet as of June 30 showed current assets of \$95,757 and current liabilities of \$11,142.

# CRUSHED STONE INDUSTRY PREPARES FOR A YEAR OF GREAT ACTIVITY

THE NATIONAL CRUSHED STONE ASSOCIATION had its 20th annual convention in Cincinnati, January 18-20; meetings were well-attended and the program was interestingly instructive. Business conditions in the industry, as reported, offered a pleasing contrast to those reported at the 1936 convention; considerable buying was done at the exhibit and it can be said that exhibitors generally considered their time well spent.

H. E. RODES, Franklin Limestone Co., Nashville, Tenn., was reelected president. Regional vice-presidents are: C. M. DOOLITTLE, Hamilton, Ont., Canada; E. EIKEL, New Braunfels, Tex.; N. E. KELB, Indianapolis, Ind.; A. S. LANE, Meriden, Conn.; J. A. RIGG, Fort Spring, W. Va.; T. I. WESTON, Columbia, S.C.; A. J. WILSON, Watsonville, Calif.; PORTER W. YETT, Portland, Ore.

President Rodes, in his opening remarks, expressed his thanks for the improved financial support of members, and complimented J. R. Boyd, administrative director, and A. T. Goldbeck, engineering director, for their good work in rebuilding the association during the year passed.

## Business Conditions

Reports by the regional vice-presidents on conditions in their territories showed an improvement in the crushed stone business, along with the general upturn. Production in 1935 had suffered because of delayed highway programs. An increase in highway lettings and a general pickup in other business netted a substantial increase in demand in 1936, with more increase expected in 1937.

T. I. WESTON, reporting for Georgia, North Carolina, South Carolina and Tennessee, said that the volume of business increased 20 to 89%, with a rise of 20% in price. The volume represented about 60% of the plant capacities. He said that 60 to 75% of the volume was used in highways, 10 to 20% for railroad ballast and 10% for building construction. As good or a better year was forecast for 1937, with about the same tonnage and distribution, and firm prices, which may increase. Government competition offers a serious problem in Tennessee and somewhat in the other states. Portable plants were reported to be making increasing inroads in some states. WPA competition was considered serious in Tennessee.

PAUL W. NAUMAN, reporting for Iowa, said that there was a slight improvement in business, with a better price level. Plants in Iowa, according to reports from producers, operated at 25% capacity in 1936. 50% of the production going to highway construction, 25% for

building construction and the remainder for agricultural stone. The government is taking a large volume of stone for road surfacing, and the demand for such works by counties and cities is decreasing. He said that stationary plants are becoming outmoded and that the trend is toward portable plants. There has been considerable competition from WPA. In one instance, a county produced 15,000 cu. yd. of stone on a single project with its own equipment, operated by WPA labor.

J. A. RIGG, for part of Indiana, Ohio, Virginia and West Virginia, reported increases in volume in all, with one exception. Price levels remained about the same, with prospects of increases in 1937 in both prices and tonnages. He said that the demands were about 40% of existing capacities, with a distribution of 40% to highway construction, 20% to railroad ballast, 10% to building construction and 30% for metallurgical and other uses. Mr. Rigg said he believed that railroads had progressed to the point where their needs are on a fixed basis, so that no increased volume for ballast can be expected in 1937. He said that there is a possibility of an increase in fluxstone, that the needs for building construction should be greater, and that the agricultural demand would stimulate sales of limestone. A case was mentioned where one state is producing agricultural stone and aggregates, using convict labor and a portable plant. It was suggested that producers concentrate on quality materials, that the research bureau be maintained and that the association be represented on all committees wherever the use of stone or competitive products is discussed.

E. EIKEL, reporting for the Southwest, said that the volume of crushed stone produced in 1936 exceeded 1935 tonnages, with no change in prices. The demand represented about a third of capacity, with a distribution of 65% for highways, 15% for railroad ballast, 10% for building construction, 8% for the chemical and metallurgical industries and 2% for miscellaneous uses. He expects the 1937 demand to be about the same, with prospects of lower prices. A 5% increase in demand — expected for railroad ballast and a slight decrease in highway construction. About 60% of the 1937 production is expected to be used for highway construction, 20% for railroad ballast, 9% for building construction, 9% for chemical purposes and 2% for agriculture and other uses. He said that government competition is on the increase, with substantial losses suffered by private producers. Portable plants are on the increase and WPA has aggravated the situation. He said that about

25% of the total volume was produced by the government or its agencies, and that a reduction in freight rates is urgent to help meet the situation.

PORTER W. YETT, reporting for the Northwest by letter, said that the 1936 volume was up 20%, at the same price level as in 1935, with the demand requiring 35 to 40% of plant capacities. Of the total, 60% was used for highway construction, 5% for railroad ballast, 5% for building construction, 10% for agricultural stone and 20% for revetment work and miscellaneous uses. He said that portable plants were on the increase and were displacing stationary plants. A need for technical advice from the association on the rehabilitation of plants was expressed.

The report for the northern territory was not read. There was an average increase in volume of 35% in this territory, the greatest increase being in the Chicago area. Plants operated at 50% capacity. About 1,000,000 tons of agricultural limestone was sold in this area in 1936. Government competition is not on the increase, and there is a demand for better graded aggregates. Railroad rates have been such as to greatly benefit established producers. The market for chemical and metallurgical stone is promising, and an increase in railroad ballast is expected. Higher prices are anticipated along with an increase of 15 to 25% in volume.

## Research Possibilities

A. T. GOLDBECK, engineering director, in his annual report, deviated from the usual practice of bringing before the members a brief digest covering the activities of the engineering division, and instead outlined needed researches in the use of aggregates. Mr. Goldbeck opened his talk by saying that the crushed stone industry is on the threshold of what appears to be a year of great activity in the construction industry, with many uses open to crushed stone, some firmly established, others of recent origin and still others to be developed, and all continuously bringing to light technical problems. It was urged that members advise the engineering director of such problems needing investigation.

Mr. Goldbeck, in discussing concrete pavements, said that he was unwilling to accept the standardized beam test as the ultimate and all-inclusive test for highway concrete, because of many instances in which great differences are being developed in the amount of cracking taking place in concrete roads containing different aggregates. It was suggested that the beam test did not approximate actual conditions, specimens being cured under standard curing con-

ditions with a load applied slowly and only once up to the point of failure. When placed in a highway, concrete is immediately subjected to shrinkage effects, temperature changes cause expansion and contraction, and passing wheel loads produce repeated internal stresses. Mr. Goldbeck said that it was reasonable to believe that this pre-stressing might affect in a dissimilar manner concretes made with different aggregates.

#### Laboratory Load Tests

He told of a preliminary series of repeated load tests made in his laboratory for the purpose of shedding some light on the real significance of a comparatively small difference in modulus of rupture of different concretes. Such beams were placed around the circumference of the circular track testing apparatus and wheel stresses applied. It was observed that all the beams had been reduced in strength by this small number of repetitions of load. Not only did the test show that the strengths under actual conditions differed from those as tested ideally in testing laboratories, but that small modulus of rupture differences produced much higher differences in resistance of the concretes to repeated rolling loads. It was suggested that these preliminary tests need further refinement in method and that results will show that a crushed stone concrete, if the modulus of rupture is higher than in other concretes, will give superior results.

Other tests pointed out as of importance and of interest are investigations on the relative impact resistance of various concretes, since rolling loads do produce impact, and differences in temperature expansion and contraction of concrete due to the differences in coefficient of expansion of the respective aggregates. Cracking in concrete highways was suggested as being partly due to differences in the coefficient of expansion of the aggregates. Another need for investigation was pointed out as being tests on the effect of freezing and thawing on the service value of different concretes and their resistance to repeated loads.

Mr. Goldbeck touched briefly on the scaling of limestone sand concrete roads, some of which has been attributed to the presence of pyrites, or iron sulphide, in the limestone, causing internal expansion and disruption of the concrete. He said that other factors were also present in these cases. Most of the limestone sand concrete roads which show excessive scaling were made with a sand having a large percentage of coarse fragments, between the No. 4 and No. 8 size, producing harsh-working concrete. He said that, in an effort to overcome this harshness, the contractor has added excessive mixing water, which rises to the surface and creates a weakened, porous surface layer which is attacked by frost. It was pointed out that investigations on proper grading of sand and denser con-

crete mixes or the use of admixtures might reveal that the presence of sulphides may not be objectionable in reasonable amounts.

Mr. Goldbeck, in discussing mass concrete, said that studies are to be undertaken to determine the adhesion between the mortar and the coarse aggregates, measurements of the relative movement to be expected as between the mortar and the aggregate and an attempt at a theoretical study of the internal stresses caused by such movement. He felt that special laboratory studies are needed immediately, because of the large tonnages of aggregate involved.

The subject of stone sand has been treated in Bulletin 10, recently published by the association. Laboratory studies had been made to determine how to write specifications for stone sand and these studies did much to reveal the proper gradation for this material. Mr. Goldbeck said that every effort should be made to learn beyond doubt what the ideal gradation for stone sand should be. He said that engineers seem loath to admit much dust below the No. 100 sieve in size. Further studies were suggested to show whether such sizes were not actually beneficial in promoting the durability of concrete, for better workability, etc.

On the subject of tests for coarse aggregates, Mr. Goldbeck expressed doubt as to whether the abrasion and toughness tests now used are really valuable for indicating probable service behavior. He discussed the recently developed Los Angeles rattle test and said that investigations should be made to determine the reliability of this test for different types of road construction.

Mr. Goldbeck discussed different types of stabilized roads, for which crushed stone has excellent properties. He said that the best methods of using crushed stone for stabilized surfaces had not yet been determined. Efforts are to be made along these lines and the proper combinations of stone with the various admixed materials. Important questions to be answered in regard to bituminous surface treatments are gradation limitations; the effect of porosity of the stone on the type of bituminous material which had best be used; the matter of permissible amounts of dust; the question of the necessary physical test requirements especially with the Los Angeles rattle; and the effect of condition of moisture of the stone when being used as a cover material.

Much investigation is still needed for writing proper specifications for railroad ballast, according to Mr. Goldbeck, and certain facts must necessarily be developed through laboratory tests so that the interests of crushed stone producers may be properly represented. Possible improvements in the construction of stone ballasted track were suggested. For example, preliminary experiments in the laboratory indicated a possibility of choking the surface voids of ballast with small size stone to eliminate much infiltration of cinders, and possibilities of diverting a great deal of the surface water from immediate passage to the subgrade. He concluded by saying that every effort will be made to solve the problems on hand which are most pressing, and invited members to submit their questions.

#### Association Prospects

J. R. Boyd, administrative director, discussed finances and general activities undertaken by the association during the past year. He said that the co-operation of the members in the way of financial help had made it possible to meet the crisis at hand early in the year, and that the association is looking ahead toward increasing its activities. This first session of the convention was closed with the announcement of the auditing, nominating and resolutions committees.

#### Stone Sand

Stone sand, which is being used to an ever-increasing extent throughout the United States, was the principal subject of an afternoon meeting. R. R. Litehiser, chief engineer, Bureau of Tests, State Department of Highways, Columbus, Ohio, treated the subject, "The Use of Stone Sand in Concrete Construction," from the point of view of the experience of the Ohio Department of Highways. Mr. Litehiser was particularly qualified to speak on this subject, since many miles of concrete pavements have been built with stone sand fine aggregate and the state has given much study to its use.

The experience of the Ohio State Highway department was reviewed, since the first use of stone sand in 1923. The concrete pavement in this case was badly cracked, as are most concrete roads built before the introduction of expansion, contraction and center joints, but the concrete itself is in fair condition, though considerably scaled. On another job in 1928, "washed limestone screenings" were used, with some scaling but no progressive disintegration.

Mr. Litehiser told how the engineers of the department were reacting to the material, by referring to their fine aggregate specifications. Natural sand was the material accepted under the 1914 specification. The 1925 specifications were qualified to not "admit the use of stone or slag screenings unless their use has been approved by the director in writing". The written approval of the director was no longer required in the 1929 specifications, which read, "unless permission to use same is shown on the plans or in the special provisions and proposal". Not until 1931 did the words "limestone sand" appear in the specifications, but finally, in 1933, stone sand was admitted on an equal basis with natural sand, with slightly more liberal limits on the fines. The Ohio State University stadium, built in 1921 and 1922, was mentioned as an outstanding argument for good,

durable concrete made from stone sand.

From 1923 to 1935, about 6% of a total of 3049 miles of concrete pavement and base were built with stone sand as the fine aggregate, and in 1936, 20% of the total mileage was such concrete. About 40,000 tons of stone sand were used in this work in 1936, said Mr. Litehiser. Charts were used to illustrate comparative data on concrete made from natural sand and stone sand fines, stone sand weighing 90 lb. per cu. ft. in a dry loose condition and natural sand weighing 95 lbs. in a similar condition. In the case of the particular samples used, compressive and transverse strengths were slightly lower in the case of stone sand concrete. He said that an excessive amount of water was probably used with the stone sand used, which is reflected in the resulting compression strength.

#### Stone Sand Specifications

Mr. Litehiser said that the stone sand specifications were started with a grading as consistent with that of natural sand as was commercially possible, which he admitted to be a serious error. The result was a harsh working concrete, comparatively difficult to place and finish in the pavement. Mr. Litehiser said that steps are being taken to make correction and that a finer grading than that used in 1936 is to be required in 1937. This specification requires 100% to pass the No. 4 square opening, 95 to 100% through the No. 8, 50 to 70% through the No. 16, 30 to 50% passing the No. 30, 10 to 30% through the No. 50 and 3 to 10% passing the No. 100.

This specification will result in a much more workable concrete. The connection between soluble sulphur compounds in fine aggregate and disintegration of the concrete in the pavement actually observed made necessary the placing of a sulphur limitation of 0.3% by weight of fine aggregate on all fine aggregate.

According to Mr. Litehiser, very satisfactory results have been attained from the use of stone sand in dense graded bituminous concrete in Ohio since 1931. During the past two years, about 60,000 tons of stone sand were so used by the Ohio State Highway Department, representing about 50% of the sand total in this work. He concluded by saying that with the exception of the finer grading now required for use in portland cement concrete, stone sand is an alternate on an equal basis with all other fine aggregate under the specifications of the Ohio State Department of Highways.

A. T. GOLDBECK, engineering director, said that there was no need of being discouraged by the lower strengths shown in Mr. Litehiser's tables; and explained why there have been samples of comparatively poor concrete made from stone sand as fine aggregate. The coarse gradations used made for a harsh working concrete. The tendency is for the contractor to use more water. Be-

cause of insufficient surface area to hold the water in place, the water rises to the surface and a high water-cement ratio is created there, consequently, a weak, porous surface layer. Also, a rather weak mortar due to high water-cement ratio will reduce the strength of the concrete throughout. Mr. Goldbeck urged that, because of the relative newness of the product, producers take pains to turn out high class material. He commended the change made in the Ohio state specifications, as being a change in the right direction.

Producers were given an opportunity for general discussion of methods used in the preparation of stone sand. The discussion was led by J. JACKSON and J. A. RIGG, both of whom have been very successful in producing stone sand, and speak with authority on production methods.

Mr. Jackson's concern, Carbon Limestone Co., Youngstown, Ohio, has been manufacturing stone sand for the last 7 or 8 years, so he speaks from experience. The first requirement for the manufacture of good stone sand is a Grade A rock deposit, said Mr. Jackson. His claim is that stone sand cannot be made satisfactorily without washing. In some of the early jobs furnished by this company it was apparent that the coarse particles made it hard to finish the concrete and a nice smooth job was finished only with difficulty. Then the screens were changed and the coarser, jagged particles of rock were removed.

Mr. Jackson said that his company was fortunate in that the interior gradations were all right at the plant, and it was unnecessary to make the sand in two ways and blend them, as finer particles were required. The problem was to eliminate the fine dust, which is done with a sand cone. The 4-mesh dust is pumped into the sand cone and the cone is discharged into dewatering screws, which remove dirty water and the very fine particles from the sand. From the beginning of the manufacture of stone sand, it was necessary to eliminate some of the 100- and 200-mesh material. Mr. Jackson noted that in some plants there is a shortage of very fine dust, and sand had to be made in two sizes and blended to the proper gradations.

J. A. RIGG, of the Acme Limestone Co., Fort Spring, West Virginia, told of experiences in the manufacture of stone sand by the dry process. Mr. Riggs emphasized the importance of a proper approach to the manufacture of stone sand and said that the chief danger to present successful producers was more from what other producers are doing than the criticisms of engineers. Many producers today are faced with an overabundance of some products from their screenings, which they would like to market profitably. In Mr. Riggs' case, the problem was to find an outlet for minus  $\frac{1}{4}$ -in. stone, instead of allowing the railroad company to haul it away free by the thousands of tons. The plant is located near the top of

Allegheny mountain, and natural sand is quite distant and expensive. A study of natural sand was made to determine if other materials could not serve the same purpose for fine aggregate in concrete. It was decided that stone sand could be manufactured that would be at once consistent in physical and chemical characteristics and uniform in grading.

#### Samples Graded

The approach was to take the competitive natural sand and endeavor to make a sand at least to equal it. A firm of local commercial testing engineers was employed to take samples and to determine just what grading was necessary in order to make a concrete equal in strength to that in which natural sand was used. After a series of tests, a tentative gradation was adopted. Mr. Rigg said that it was the producer's job and expense to determine the suitability and gradations before trying to pass off stone sand on the consumer.

It was decided that the gradations adopted could not be realized by the wet method, since some of the minus 100-mesh material had to be pulled out and intermediate gradings were to be changed somewhat. The operation is done by a series of screens dividing the screenings into 4 or 5 sizes and putting those sizes back in the proportions as designed by the engineers. Excess minus 100-mesh material is removed by an air separator.

Mr. Rigg said that after some years of experimentation washed sand and dry sand can be put together, and to compensate for the off grading of the wet sand by grading the dry sand to compensate. However, the demands for wet sand are such that very little is used, the sand being 90 to 95% made by the dry method. Stone sand from this plant has been used in many large projects, including 25,000 tons in lining the longest tunnel on the Chesapeake and Ohio railroad.

In reply to questions on grading to reduce the water-cement ratio, Mr. Litehiser said that improving workability compensates to a considerable degree for such ills as are believed to exist in stone sand.

R. C. SHEPHERD, Carbon Limestone Co., Youngstown, Ohio told of a job now being furnished with a stone sand with 90% through the 8-mesh, where a concrete is being made with the low water-cement ratio of 4.6 gal. of water per sack of cement.

Mr. Rigg said that there was no difficulty in making a dry fine grading in wet weather, except in very severe winter weather. He added that by using the dry method, there is an opportunity of sending the rejects of the screenings (excess between 8- and 4-mesh and 8- and 14-mesh) back to a hammer mill and producing more fines to correct the lack of those sizes in the natural product.

### **Woes of the Railways**

M. J. GORMLEY, executive assistant to the president, Association of American Railroads, Washington, D.C., discussed progress of the railroads. What Mr. Gormley had to say on recovery was of interest to the crushed stone industries, since each is an important customer of the other. Mr. Gormley said that car loadings were 13% up in 1936 as compared to 1935 and that freight traffic in 1936 was the best since 1931, with passenger traffic the best since 1930. The trend toward higher speed trains was pointed out as of importance to those who furnish the materials to adequately ballast the roads for such traffic.

Mr. Gormley said that capital expenditures for ballast dropped from 11½ million dollars in 1930 to one million dollars in 1933, but had increased to over three million dollars in 1935. About \$8,000,000 was spent for maintenance of railroads in 1935, with 40,000 new cars and more on order.

### **Agricultural Limestone**

The crushed stone industry sold much agricultural limestone to farmers in 1936 due to efforts of the Federal Agricultural Conservation Program, and has been looking forward to some business from this source in 1937. The paper,

"The Use of Agricultural Limestone in the Federal Agricultural Conservation Program for 1937" by J. F. Cox, senior agronomist, division of program planning, Agricultural Adjustment Administration, Washington, D.C., revealed encouraging possibilities for this year.

Mr. Cox said that the 1937 program is directed toward the stopping of soil losses from erosion by wind and water and from extractive farming, with the building up of soils through the balancing of crop rotations and by the general encouragement of sound farming practices that conserve and improve the land, as major objectives. Specific awards are made to cooperating farmers for a shift from soil-depleting crops to the legumes and other soil-conserving crops, with additional awards for liming, fertilizing, terracing, etc.

Mr. Cox said that the application of lime is recognized as of basic importance in the agricultural conservation program and that ground limestone, or some other form of agricultural lime, is needed for the establishment of soil-conserving crops over the greater part of the humid areas of the eastern half of the United States and in certain western areas.

He said that experiments have shown clearly that rapid depletion of lime from the best soils occurs, with reductions of crop yields from the acidic soils. Dr.

F. C. Bauer was quoted as stating that limestone must remain the key to any successful soil-building program on lime-deficient soils. Mr. Cox said that Bulletin 607 of the New Jersey agricultural experiment station indicates that lime is being depleted from our surface (6½ in.) of soil at a rate that would completely exhaust calcium and magnesium in our soils to plow depth in 170 years, if our present program of exploitative agriculture continues.

In this report, the net annual loss of calcium is estimated at 55,624,057 tons and 20,517,068 tons for magnesium, with a normal application of only about three million tons of agricultural lime. Dr. R. M. Satler of the Ohio experiment station, was quoted as recommending that the annual usage of lime be increased to at least 5 times the maximum yet applied. Mr. Cox said that liming and fertilizing, as essential practices, must be included in our farming methods, and that prices received from crops must be sufficient to include the cost of applying lime and fertilizer and of rotating crops.

He said that as the use of lime increases, the mineral and vitamin content of our grains, vegetables, meat and milk increases also and that there will be less malnutrition in children and people will be healthier, happier and longer lived.



One of the first installations of the Marion 4161 4 1/2-yd. shovel, developed in 1936, for heavy duty. Ward-Leonard control and dual vertical swing motors are featured

As for 1937, Mr. Cox said that at least the 4,000,000 farmers who cooperated in 1936 could be expected to take part, for which awards will be paid contingent upon the authorization by Congress of the 1937 appropriation of some \$470,000,000. He said that the National Lime Association had estimated that the tonnage of ground limestone and other liming materials had increased from 2,433,841 tons in 1934 to 3,291,789 in 1935, and that J. R. Boyd estimated an increased tonnage of 100% in 1936 in most lime using states, due to the agricultural conservation program. A further increase was forecast for 1937. The paper concluded with a listing of payments for the use of ground limestone or its equivalent, in different regions.

#### Silicosis

DR. R. R. SAYERS, medical officer in charge of industrial hygiene, U. S. Public Health Service, Washington, D. C., in his paper "Silicosis—What it is and How to Prevent It", defined silicosis as being strictly an industrial disease of the lung due to breathing air containing silica dust ( $\text{SiO}_2$ ) or quartz dust, quartz being only one type of free silica. The disease has been known for centuries and since 1900 has been studied in practically all of the civilized nations in the world, according to Dr. Sayers. Silicosis was described as being a chronic disease characterized by shortness of breath, decreased lung expansion and an unproductive (no sputum) cough, followed by a generalized nodulation throughout both lungs.

In the early stages he said that there are few symptoms. The man feels and looks as well as ever and has little if any decreased capacity for work. As the disease advances and small nodules coalesce, a decreased lung expansion and shortness of breath follows, accompanied by a decreased capacity for work. Later on, the symptoms increase and he no longer is capable of doing his work. Dr. Sayers emphasized as of extreme importance the ready susceptibility to respiratory disease, during all stages of silicosis. The nationality and age of the person have something to do with susceptibility, he said.

The greatest predisposing cause is the presence of respiratory disease, especially tuberculosis. Dr. Sayers said that a man with active pulmonary tuberculosis is very much susceptible and that his disease will progress more rapidly if he is exposed to breathing of free silica, and other individuals with silicosis are more susceptible to tuberculosis.

The size of the particles known to cause silicosis are the order of the size of bacteria, most of them ranging from one to five microns in size (a micron is  $1/25,000$  inch). Dr. Sayers told of concentrations to which men may be safely exposed, illustrating with figures for a number of cases and dust counts. Based on all these studies, 5,000,000 particles was considered as safe with a high silicious ore or rock. Under these



*Max Lambert, Robins Conveying Belt Co., chairman, manufacturers' division N. C. S. A.*

conditions, a man will not develop silicosis in a working lifetime. As a formula, multiplying the percentage of free silica in the dust that is breathed expressed as a decimal by the number of particles in the air breathed should determine the danger in any locality. Dr. Sayers said that if the result is less than 5,000,000, it probably will be satisfactory, except in cases where the concentration of dust is more than 100,000,000.

Methods of control were discussed. He said that in his belief there is available enough engineering and medical skill and knowledge to prevent the disease in any industry. The wetting of materials, the isolation of dusty processes, local and general ventilation and the use of respirators and masks were suggested as of help in prevention. He said that medical control should be aimed chiefly at seeing that no man with active pulmonary tuberculosis goes into dusty atmosphere where silicosis may be produced. Physical examinations would determine such disease, and when done periodically will determine if the engineering methods employed are successful.

T. C. WATERS, attorney, Stockbridge and Waters, Baltimore, Md., spoke generally on the subject of silicosis. He said that in view of all the publicity and sentiment, it was imperative to draw up some definite legal action to protect producers from unjust claims. Already much federal and state legislation on this problem is being contemplated. In general, his discussion followed along the lines of his earlier paper, published in the December, 1936, issue of *ROCK PRODUCTS*, pp. 46-48.

#### Developments in Highways

The use of crushed stone in all types of highway construction has always been a large percentage of the produc-

tion of plants throughout the United States. Consequently, the report of E. F. KELLEY, chief, division of tests, U. S. Bureau of Public Roads, Washington, D. C., on "Significant Developments in Highway Investigations" was of importance to all in attendance at the meeting. The paper presented a summary of recent accomplishments and the present trends in those phases of highway research of particular interest to the crushed stone industry.

Mr. Kelley said that, in addition to soundness and grading of aggregates, the kind of coarse aggregate used is known to greatly influence the flexural strength of the concrete pavement. This is so pronounced that in extreme cases a change in the kind of coarse aggregate may reduce the flexural strength as much as that caused by the omission of one sack of cement per cubic yard of concrete. For this reason, Mr. Kelley said that the nature of coarse aggregate cannot be ignored when designing concrete paving mixtures.

He said that, for a fixed water-cement ratio, the same strengths will not necessarily be obtained with all kinds and combinations of aggregates, this fact being the reason for the so-called trial method of design being favored by the Bureau of Public Roads. Differences in the characteristics of the aggregates available in a given territory are likely to cause variations in the water-cement ratio, with resulting variations in the amount of cement required per cubic yard of concrete. However, durability and freedom from cracking are considered as of equal or greater importance than strength.

The soundness or durability of the aggregates used is of great importance to the durability of the concrete, and, according to Mr. Kelley, better testing methods are needed for definite measures of the durability of aggregates. He recommended that the use of the sodium sulphate test be continued until better tests are devised, but only as a warning of possible unsoundness and with a provision for the acceptance of aggregates failing to meet the test if a satisfactory service record for such aggregates can be established. Such requirements now appear in federal specifications.

He said that the Los Angeles rattler test gives evidence of being the most satisfactory so far in the measuring of the resistance of coarse aggregates to wear and impact, because of its simplicity and better agreement between test results. It is believed that other tests will be abandoned in its favor and that definite progress in the evaluation of aggregates will take place at that time.

Mr. Kelley spoke at some length on the advantage of vibrated concrete. Investigations have shown that vibration permits the use of a higher percentage of coarse aggregate and a lower water content than would otherwise be required and that a denser concrete results. The use of a smaller amount of

fine aggregate in such concretes can be expected to result in pavements of greater durability and less scaling, according to Mr. Kelley.

In discussing the use of aggregates in asphaltic mixes, Mr. Kelley said that some rock is unsuitable for use, without some special treatment, because of a greater natural affinity for water than for asphalt. He said that there was a need for numerous investigations of the adhesion and the wetting properties of aggregates and bitumen.

In discussing stone sand, no reasons were forthcoming why such sand of suitable grading, manufactured from sound rock should not be a satisfactory fine aggregate for portland cement concrete. It was pointed out that in roads stabilized with bituminous materials or portland cement, while aggregates are not essential, their use is advantageous from the standpoint of economy. Mr. Kelley said that this is a market for quarry products, particularly the finer materials that frequently are wasted, and that the industry has an opportunity, if it so desires, to enlarge and extend this market. In order to extend the use of stabilized mixtures to the smaller political units, such as towns and counties, it was suggested that aggregate producers might establish proportioning and mixing plants at convenient locations as a service to highway engineers.

#### Labor Problems

One of the highlights of the convention was the address, "What's on the Worker's Mind Today", by WHITING WILLIAMS. Employer-employee relations always have been a problem offering a challenge to industry, so members listened attentively to one who has had a broad experience in this field.

Mr. Williams said that there was an inclination to exaggerate the differences in employer and employee relationships. He believes that troubles are not caused by class issues, as labor leaders claim, not by large issues, but are due to an aggregation of small, unadjusted grievances. In other words, the employer has showed a lack of understanding or has neglected his promises on small matters, if he has trouble.

Mr. Williams believes that labor leaders are taken entirely too seriously in the United States; that in every case of a strike they must obtain active or passive coöperation. He said that 60% of the workers are pro-job, 20% pro-union and 20% pro-company. Unless the group as a whole has unadjusted grievances due to failure somewhere in human relations, the labor leader will get nowhere, in his opinion.

Mr. Williams said that the key to what's in the worker's mind can be gotten by looking at your worker's experience of yesterday. For example, the experience of yesterday was depression. Fear, particularly of unjustly losing one's job, was uppermost in the worker's mind. He believes that 90% of all labor trouble in the last three years

was from this cause. Joblessness is a calamity to workers because they wish to take pride in their jobs. He said that fear prevailed in hard times, pride at all times and hope in good times, and that employers should be able to get along with workers in prosperous times better than at any other time.

Fairness and the elimination of favoritism were pointed out as important in keeping healthful employer-employee relationships; fair treatment by foremen who in big organizations are as near as the average employee comes to management. Also, the distinction between skilled and unskilled labor must be maintained by proper wage differentials. In closing, Mr. Williams said that the average American workman is not red, and that efforts should be made to keep in close touch with the heart and mind of the workers.

#### Stabilized Roads

C. L. McKESSON, vice-president, American Bitumuls Co., San Francisco, Calif., had prepared a paper, "Stabilizing Quarry Fines for Base Construction", which was read in his absence. He told how stone screenings can be used advantageously in combination with an emulsified asphalt.

R. A. GIDDINGS, secretary, Calcium Chloride Association, who has made an intensive study of the subject of stabilized plant mixes, read a paper, "Low Cost Roads Will Multiply Stone Markets". He emphasized the matter of proper grading of materials and the importance of correct quantities of water in such mixes. He said that there were very few naturally stabilized materials, and concluded by pointing out the advantages of producers going into this business.

#### Legislation

The concluding session was largely taken up by the reading of papers and discussion of legislation of direct interest to the industry, followed by committee reports. Much of the future for crushed stone operators depends upon what governmental agencies intend to do. The attitudes of the governments, both state and federal, were well covered in a paper, "Future Policies in State and Federal Road Building" by W. C. MARKHAM, executive secretary, American Association of State Highway Officials, Washington, D. C.

He opened his discussion with the remark that future roadbuilding cannot be predicted without a budget balance, and assured that road-building will always be done, with continuous programs the logical procedure. He said that there was a fixed federal policy in connection with the unemployment problem. It was suggested that the proposed federal road system might clash with the advocates of farm-to-market roads. Not much mileage of main line express highways is to be expected.

Economic surveys are now being

made in 40 states. About 14% of the roads are now in the state highway systems and, according to Mr. Markham, little is known about other highways. He said that federal aid is becoming an increasing responsibility and that there is a trend toward centralization, with counties likely to serve as local highway authorities.

According to Mr. Markham, with a return to prosperity there is liable to be more diversion of gasoline tax money. He said that federal aid is definitely extended to June 30, 1939, but that other Federal funds would likely be shut off if any attempt is made to balance the budget. Safety was considered as of importance in governing future highway plans. The relocation of many miles of highway is needed, according to Mr. Markham, but such work comes slowly and is often very costly. As for the safety of traffic, the demand for speedsters' highways cannot be met, although the design of highways and defects have caused but a very small percentage of accidents.

The paper, "Outlook for Federal Legislation Affecting Industry", by J. C. GALL, associate counsel, National Association of Manufacturers, Washington, D. C., was of considerable significance, since so many legislative measures of vital concern to the industry are under consideration. Mr. Gall said the social security law affects most those industries with a high percentage of labor cost. In discussing the Robinson-Patman Act, he said that most legislators believe that costs are passed on to the consumer, which unfortunately is not always the case. He said that high wages are the effect of prosperity and not the cause.

There is to be no substantial change in taxation, even in the case of the undistributed surplus tax, said Mr. Gall, and little change is to be expected in the Social Security Act. He believes that no exemptions will be accorded at this session of Congress for private pension plans, and that labor will not win repeal of its assessment for old-age pensions.

Other possibilities are that there will be no chance for the 30-hr. week; that nothing will be done in regard to collective bargaining until the Supreme Court passes on the act creating the National Labor Relation's Board, which will likely be declared unconstitutional; a new Guffey Coal Bill will be drawn up; and something will be done in regard to government reorganization.

In discussing the Anti-Trust Acts, Mr. Gall said that basic laws and methods of administration must be distinguished; that business as a whole believes in the fundamental principles of the laws, and a change in methods of administration is all that is wanted. He believes that much voluntary coöperation is possible under such laws as the Robinson-Patman Act, and that business men can now legally agree among themselves on wages and hours. It was said that the only federal statute under

which the government can move against labor disturbances is the Sherman Anti-Trust Law, courts having always upheld labor's contention that local strikes did not affect interstate commerce.

The real issue at stake, it was pointed out, is the possibility of legislation governing production, labor, wages, etc., and Mr. Gall reminded his listeners that the President has not said conclusively that he did not want an amendment to the constitution. In discussing the O'Mahoney Bill, relative to the federal licensing of industry, Mr. Gall said that the bill defines as interstate the very things that the courts have said are not interstate commerce.

His belief is that the Walsh-Healey Act is likely to be widened in its application and that the Robinson-Patman Act is too vague and uncertain in its implications. Proposed amendments to the latter act are that private suits for triple damages be omitted until the law is certain; that the criminal section be eliminated; that consumer goods only be included, and capital goods ruled out; that the terminology be cleared up; that recognition be given to functional price differentials; and that it be left to the discretion of the Federal Trade Commission to prescribe quantity differentials.

In concluding, Mr. Gall said that the president is putting the burden to re-employ on business, but should recognize that much has already been done. He said that the unemployment problem

is now one of voluntary unemployment and that there is need for regulation of labor.

#### Safety Awards

The *Explosives Engineer* trophy was presented to Elmer Heise, safety engineer, Columbia Quarry Co., St. Louis, Mo., in the safety contest promoted by the association. The company completed the year 1936 with the largest man-hour exposure and no lost-time accidents, establishing a record of more than four such years. The presentation was made by a representative of the Bureau of Mines, Washington, D.C. Certificates of merit were awarded to other companies which had no lost-time accidents in 1936.

#### Resolutions

The report of the resolutions committee was drawn up for the purpose of considering certain Federal legislation, either in existence or proposed, which will directly affect the crushed stone industry. The purpose was to treat these Acts and proposed Bills only within these limits. The association felt, by history, experience and general acceptance, that it was fully warranted in expressing the views of the industry in these matters.

The resolutions committee, because of the reasons for failure of the past N.R.A., went on record as saying that new legislative action on this subject

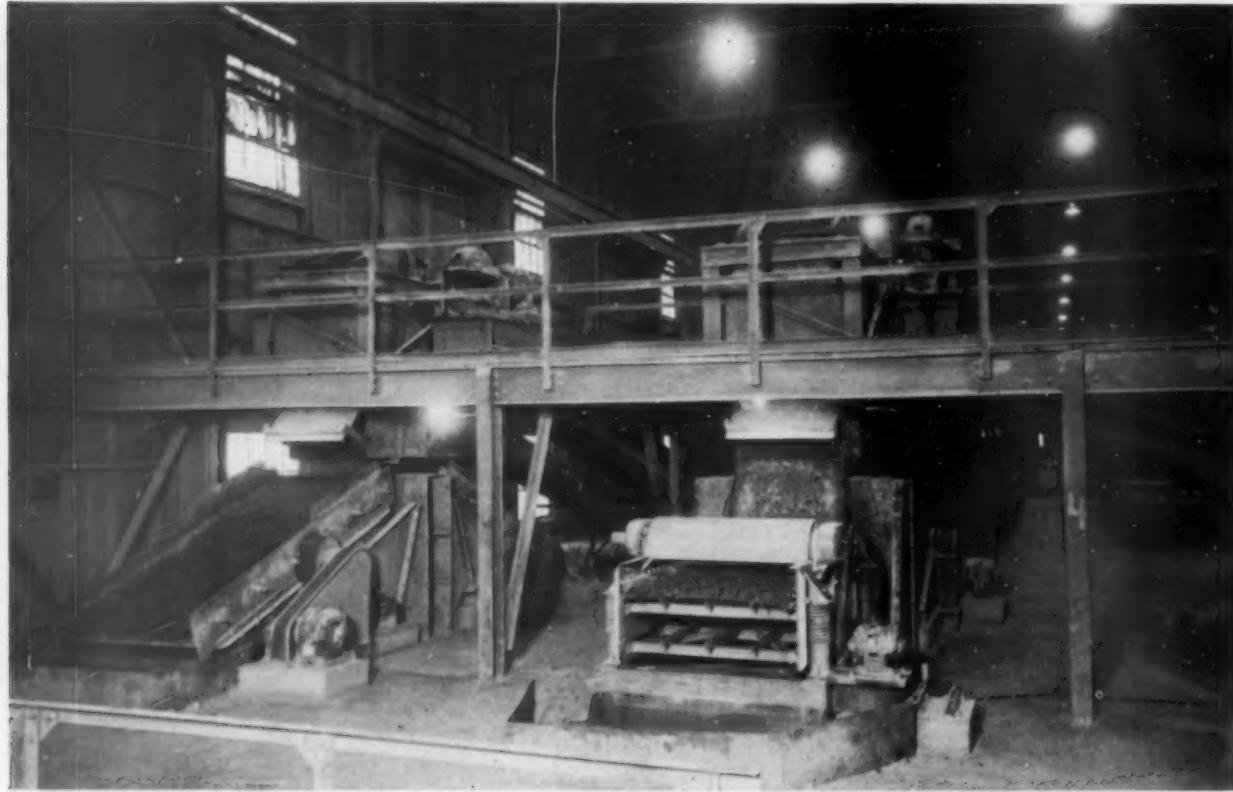
would offer little of interest to the crushed stone industry unless industrial self-government is backed by effective enforcement.

The committee, in discussing anti-trust laws, was of the opinion that some governmental agency should be created to aid proper business co-operation, to interpret the clarified laws, to grant sanctions for trial of industrial agreements, and to protect against legal penalties where such trials are made in good faith under its auspices.

It was agreed that the criminal provisions in the ROBINSON-PATMAN ACT are unnecessary; that other penalties contained therein are unfair, too drastic and unduly restrictive; and that the Act should be so rewritten that its provisions are clarified and its penalties made less drastic if the Act is to be permanently retained.

In discussing the proposed new Patman Amendment to the Clayton Act, the committee recommended that any such statute should be carefully drawn to exclude such industries as the crushed stone industry. It was felt that the purpose of legislation along these lines, the evils it seeks to abate and the arguments in favor of its adoption have no application to this industry.

It was recommended by the committee that if such legislation as the Wheeler Anti-Basing Point Bill is enacted it should provide that anyone accused of a breach of the Act might show in defense that the competitor



On the right is the first installation of the new low-head horizontal screen, developed by Robins, in the Clinton Point, N. Y., plant of New York Trap Rock Corp. This screen was on display for the first time at the N. C. S. A. machinery exhibit.

alleging injury had not made his plant price and his transportation costs generally known.

The opinion of the committee was that the crushed stone industry cannot support novel, drastic legislation such as the Wheeler Federal Trade Commission Bill, which amends the Federal Trade Commission Act and reposes almost unlimited control in the Commission at its discretion. Such a bill would have too broad powers of inquiry, investigation and censorship.

It was agreed that competition by agencies of the government in the production of crushed stone works a serious hardship on the industry, and that some adjustment of the ratio of labor to material should be made in fairness to private business as well as for promoting the absorption of unemployment into private industry. The resolutions committee went on record as advocating repeal of the Walsh-Healey Act. It was felt that this Act bears too severely on the crushed stone industry, products of which are so largely used in government work.

Finally, the resolutions committee agreed on absolute opposition to the proposed O'Mahoney Bill and its methods in attaining desirable ends. The outstanding feature of this bill, calling for rigid opposition, is the requiring of a federal license to do business, which, according to the committee, gives almost arbitrary control to the government.

#### Entertainment

At a noon luncheon, January 18, CHARLES SAWYER, former Lieutenant-Governor of Ohio, spoke on "Problems of Present Day Business". "The problems of modern business include many things other than those usually thought of in this connection, said Mr. Sawyer. "The contact of business with government in county, state and nation is increasing. Business must frankly face the increased interest of government in the operations of business".

The convention concluded with the annual banquet, January 20. CHARLES P. TAFT, Cincinnati, Ohio, in discussing "New Horizons for America", said that local government was forced to look to the state and nation for assistance in providing jobs. He said that the various activities, of housing, health and hospitals, recreation, safety, etc., are now all in the realm of local government. The state was given credit as being responsible for preventing conflict between labor and industry, and for the protection of its people in the matter of wages and hours. He said that now that we are assured of unemployment insurance and old age pensions, the only question is one of method. It was suggested that if some measures have arrived too rapidly, as it now seems to many, it is because they were held back too long. Mr. Taft said that in addition to the aim of social security, one

of the most inspiring tasks to be undertaken by the government is that of conservation of natural resources.

#### Equipment Exhibit

The January issue of ROCK PRODUCTS contained the list of manufacturers who exhibited. Detail improvements in design were evident in much of the equipment. New and important developments were noted as follows:

ROBINS CONVEYING BELT CO., New York, N. Y.—Displayed for the first time a new low-head horizontal screen, operating with elliptical stroke. The particular one on exhibit was a double-deck 4x8½-ft. screen with collecting pan, driven by a 3-hp. motor through a V-belt drive. A cash prize contest was conducted in the booth to obtain suggestions for a name for the screen. The name "Levelex" brought the \$25 first prize to E. M. Gould, superintendent, Marquette Cement Manufacturing Co., Cape Girardeau, Mo. The \$10 second prize was awarded to G. F. Hammerschmidt, Elmhurst-Chicago Stone Co., Elmhurst, Ill., for the suggestion "Flatrex". The third, fourth and fifth prizes of \$5 each were awarded to G. E. Schaefer, Rochester N. Y., R. C. Shepherd, Youngstown, Ohio and Mrs. J. R. Thompson, Frankfort, Ky., for the suggestions "Robinex", "Planex" and "Superox" in that order.

WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., E. Pittsburgh, Penn.—Exhibited a new type double reduction gear motor, adaptable for conveyors where low speed is desirable. The unit is protected for out-of-door use, is compact and eliminates couplings and bed plates. Also, a new line start for motors up to 7½-hp. was on display.

PIONEER GRAVEL EQUIPMENT MANUFACTURING CO., Minneapolis, Minn.—Displayed a working ¼ scale model of the new No. 55 horizontal balance screen, available in one or two decks to size one to five sizes simultaneously. Tests were conducted in the booth to show the screen to be absolutely vibrationless.

MARION STEAM SHOVEL CO., Marion, Ohio.—Showed working illustrations of the 4161 and 4121 Ward-Leonard control shovels developed in 1936. These machines are all-electric, full-revolving and on crawlers for faster operation and higher yardage. The 4161 is a 4½-yd. shovel equipped with dual vertical swing motors and the 4121 is a 3-yd. machine, both built for heavy duty quarry work.

ATLAS POWDER CO., Wilmington, Del.—Displayed a new triple-fifty blasting machine, designed to shoot 150 holes simultaneously.

GRUENDLER CRUSHER AND PULVERIZER CO., St. Louis, Mo.—Announced at its booth that a new sales office is being opened at 205 W. Wacker Dr., Chicago, Ill., to serve the north central states. T. A. Oberhellmann is manager of the new office.

EASTON CAR AND CONSTRUCTION CO., Easton, Penn.—In addition to the line

of truck and car bodies, displayed photographs of the new "Clarmac" electric bitumen heater recently introduced into the United States.

#### Strike Causes Reorganization

MCGILVRAY - RAYMOND CORP., San Francisco, Calif., operating quarries in Madera, Tulare and Calaveras counties, has applied to the federal court for reorganization under 77-B of the national bankruptcy law. Its financial difficulties are laid to the water-front laborers' strike on the West Coast.

#### Stripping Accident Fatal

GARRETT CONSTRUCTION CO., Springfield, Mo., had an unusual fatality at its quarry, when a tractor, used in stripping operations fell over on its driver, crushing his chest and abdomen under the seat. He was working sideways on an incline.

#### New Operation

J. T. GANAWAY, Kenbridge, Va., has purchased an old quarry formerly used for rock for the construction of the Virginian Railroad and will revive its operation for the production of riprap.

#### Modernizes

QUARRY PRODUCTS CO., Menasha, Wis., is reported to have completed installation of new equipment which makes it one of the most modern plants in the locality.

#### Threatened Suit

CANYON ROCK CO., San Diego, Calif., is encountering opposition from nearby property owners who threatened suit if a permit were granted the company to erect a concrete mixing plant in the city.

#### Slate Business Upturn

VERMONT SLATE PRODUCERS reported an upturn in demand for slate products in the past three months due to increased building construction. Some of the operators have realized a 35% increase in sales for that period.

#### Efficiency in Reverse

ATLANTA, Ga., city quarry and crushing plant were probably operated with the usual efficiency of a municipal government, but since taken over by WPA production has been 25% less.

#### Tripoli Development

STANDARD TRIPOLI CO. has started work on the erection of a tripoli mill and drying sheds capable of 50 tons of tripoli each 8-hr. shift at Baxter Springs, Kan.

# LIME PRODUCERS' FORUM

Conducted by  
Victor J. Arbe,  
Consulting Engineer,  
St. Louis, Mo.

## PERFORMANCE OF VERTICAL LIME KILNS WITH VARIOUS FIRING METHODS

**I**N YEARS PAST it was puzzling to decide what method of fuel burning to employ in the manufacture of lime. This problem, however, is gradually being solved, and the most desirable methods becoming fairly well known. Even now though, occasionally, someone embarks on ventures that are predestined to fail; as for example, powdered fuel application to vertical kiln, or the use of under-feed stokers, tried by various manufacturers many times. Experimentation is all right, but it should not be entered into without investigating first to see whether or not similar experiments have not been undertaken previously, whether or not they have proven out, and if not, why not?

The fact that a stoker works well under a boiler is no reason at all why it should work well under a lime kiln. Boilers and kilns are as different as two things can be. It is along such lines of experience that we believe the National Lime Association could do much by providing an opportunity at its annual meetings for discussion of lime manufacturing successes and failures. An industry in which the various units do not know of each other's attempts at improvement progresses slowly and the best of them waste much money and much effort in futile experiments for betterment.

For vertical kilns, standard and well-developed methods with which good results are assured are the use of mixed feed firing, with coke or anthracite; gas firing from a central gas producer plant; gas firing with gas producers individual to all the kilns. The best of them all, though, is the firing with natural gas when that fuel is available at a reasonable figure. Hand firing of coal on ordinary grates is wasteful and has been obsolete for at least two decades.

Of course there are always exceptions, but a general average of the various firing methods will give about the following fuel efficiencies:

	Thermal efficiency
Direct fired	25-35%
Semi-gas producer	35-45%
Centralized gas producer	40-50%
Natural gas fired	55-65%
Mixed-feed kilns	65-75%

The upper reasonable limits of capacity of these types of kilns properly arranged and operated would be:

	Tons per day
Direct-fired kilns	15
Semi-gas producer	30
Centralized gas producer	60
Natural gas fired	70
Mixed-feed kilns	100

### Direct Fired

Of course there are exceptions, and while direct-fired kilns may have a capacity of much less than 15 tons, mixed-feed kilns with a capacity of 200 tons of lime per day are known.

Probably the best direct-fired plant the writer ever encountered was at Joliette, Quebec. Very smoky kilns, but somehow they managed to straddle the poor conditions of excess air right before firing, and incomplete combustion right after firing, in such a way that the fuel ratio was 4 tons of high calcium lime to a ton of high grade coal. But this, for direct-fired plants, was very exceptional performance indeed. The kilns were small, so, considering their size, the production of only 10 tons of high calcium lime per day was not very low. There are many of these kilns with a ratio closer to 2 than 3 to 1, and some having a capacity of only 6 tons per day.

### Semi-Gas Producer

The best semi-gas producer plant the writer remembers was that of Glencoe Lime & Cement Co., Glen Park, Mo., but this plant has since been converted to natural gas. All of the plants of this type existing in the past, however, failed to do what could have been done if the kiln had been designed in the light of present knowledge. One approach is the kiln at Moosehorn, Manitoba, where practically three tons of high calcium lime are obtained per cord of wood. This is exceptional for wood-fired kilns, as it also is to the fire wood with semi-gas producers.

### Centralized Automatic Producer

Of the plants having a centrally located automatic producer supplying gas to several kilns, the plant of Na-

tional Carbide Co. seems the most outstanding. With Virginia coal the average eight months' ratio on the entire lime plant was 5.13 tons of high calcium lime per ton of coal, and a capacity of just about 50 tons per kiln day. At present a dolomite plant is being converted to a modern kiln type with modern gas producer firing, and the results should prove very interesting. Now, there is not a good modern dolomite plant in existence.

### Mixed-Feed Kilns

Mixed-feed kilns are used mainly in the chemical industry. Some are extremely efficient and may have capacities up to 200 tons, but this type is not used to any notable extent by the commercial producer of lime and, wherever used in this country, results certainly are not notable.

### Natural Gas

Of all the firing methods, natural gas serves the purpose best. If a lime manufacturer can obtain it for a figure up to 25c per thousand cubic feet, he may consider himself very lucky. This is not entirely due to the increased efficiency possible. There is a long list of other advantages.

The writer is a warm advocate of producer gas, but producer gas leaves him utterly cold if there is natural gas near by. The desirability of natural gas is most nobly demonstrated by the Glencoe Lime and Cement Co. plant at Glen Park, Mo. This plant has now been in operation long enough to eliminate all doubt about anything, and along practically all lines the original expectations were bettered, and, seemingly, still better results are in sight.

A very long kiln lining life, decidedly over a year, that promises to become two years, is another advantage; and this with a capacity that approaches one ton of lime per square foot of shaft area; to be exact, 55 tons of lime out of a 60-sq. ft. shaft; obtained not occasionally, but regularly, and apparently with less harm to the lining than when the kiln is operated at lower capacities.

There is remarkable flexibility. As the kiln is equipped with a gas meter and

draft gauges, the fireman can set his kiln to any rate of operation from 25 to 55 tons per day at a moment's notice, as follows:

Lime per day	Draw Time	Draft
25 tons.....	4 hours.....	Natural
35 tons.....	3 hours.....	0.4 in.
45 tons.....	2 hours.....	1.4 in.
55 tons.....	1½ hours.....	2.5 in.

Who else in the industry draws every hour and a half? In this solitary case it not only is done, but there is an advantage in doing it. When the actual drawing is in progress, the kiln is operated normally, so drawing can be as fast or as slow as one desires. When trimming the kiln, however, gas is cut off and the induced draft fan shut down. It requires, on the average, only 15 minutes to trim the kiln, but as this is done 16 times a day, the kiln gets no gas for four hours out of twenty-four, but still capacity is 55 tons and efficiency very high, with gas consumption sometimes below 5000 cu. ft. per ton of lime.

In this plant, as operated at the present, all gas is introduced in the center of the shaft. The side burners, originally used, are blanked off entirely. There is no recirculation of CO, no use of steam to control the flame and prevent damage to brick. In fact, brick is no problem; and although in this plant previously the kiln had to be repaired every two or three months, even though special high grade refractory was used, now any good grade fire brick is quite satisfactory.

One great advantage with natural gas is that there is considerable control possible over the flame distribution. It is entirely possible to give more gas to the middle and less to the ends, or more to one half of the shaft than to the other. There are really very numerous advantages and, as revealed by the following list which contrasts natural to the next best fuel, producer gas, but is in

no way intended to belittle the advantages of producer gas in its proper place.

#### Advantages of Natural Gas

- (1) A modern plant at much smaller cost.
- (2) Greatly improved quality of lime.
- (3) Lowering of operating expense.
- (4) Increase of capacity.
- (5) Reduction of repair costs.
- (6) Increase of fuel efficiency.
- (7) Reduction of supervision.
- (8) Uniform product.
- (9) No coal delivering, unloading and handling.
- (10) No gas producer men nor kiln firemen needed.
- (11) No expensive fuel preparation equipment, as conveyors, elevators, bins, producers necessary.
- (12) Large, bulky, heat-wasting gas flues not needed.
- (13) No time lost due to producer and fuel equipment wear and breakdown.
- (14) No clinker breaking, no ash handling.
- (15) No blowing of flues, no messy cleaning of dust catcher.
- (16) Kiln in action constantly, without periodic interruptions caused by the above.
- (17) Gas quality absolutely constant, not variable, as in producer-gas and hand-fired practice.
- (18) Gas quantity exactly controllable and fully constant.
- (19) No steam needed to blow producer to avoid clinkering.
- (20) No water needed to cool producer tops and stirring bars.
- (21) No power needed to operate producer.
- (22) No leaks of high CO gas from producer pipe holes or fuel feeders to impair health of the operators.
- (23) Heat loss from producer and gas flues eliminated, increasing efficiency of the plant.
- (24) No carbon in ash loss.
- (25) Combustion process concentrated within the kiln; no Dutch ovens nor combustion chambers needed.
- (26) Gas received under high pressure with possibility of forcing it to center of kiln shaft.
- (27) Gas easily piped to any part of

the kiln or plant as readily as water.

- (28) Much more air passing through cooler, much cooler lime, so more efficient kilns.
- (29) Possibility of exactly apportioning gas to each burner—impossible in producer practice.
- (30) Possibility of close control of temperature in the kiln, assuring soft burned lime.
- (31) A more uniform temperature through the hot zone, assuring uniformly burned lime.
- (32) Possibility of exactly measuring gas consumption of any kiln over any time period.
- (33) No sulphur in fuel, thus avoiding formation of calcium sulphate and impairing lime quality.
- (34) No arsenic in fuel to contaminate lime used for special processes.
- (35) Kiln exhaust gases will not be sulphur charged, and kiln tops will not corrode as at present.
- (36) Regulation of kiln capacity will be more possible, slow firing more practical and less wasteful.
- (37) With much less cleaning, a much cleaner plant.
- (38) A simpler but modern plant.
- (39) A plant readily supervised and lending itself to positive control. Simple of up-keep.
- (40) A great possibility of burning spalls down to 1-in. size in specially constructed vertical kilns at high capacity and efficiency.

#### To Expand

OHIO CALCIUM CO., Lawrence Ohio, is planning expansion of its lime plant by the addition of two new large kilns, which it is said will increase the plant's present capacity five times. Producer gas made from coal on the company's own property will be used for fuel. Carter N. Abe is president and treasurer.

#### Moves Mortar Plant

WASHINGTON BRICK, LIME AND SEWER PIPE CO., Spokane, Wash., has moved its mixed mortar plant from North Monroe St. to its Dishman plant in the Spokane valley.



Two European lime plant quarries with which Mr. Abe is familiar

# TRAFFIC and TRANSPORTATION

## Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of January 23:

### New England

40585. Ground silica rock (See Note 3), but not for closed and open-top cars of less marked capacity than 60,000 and 80,000 lb., respectively, Keene, N. H., to New York points: (Rates per 1000 lb.) Buffalo, \$3.41; Corning, 3.08; Elmira, 3.08; Lancaster, 3.30; Niagara Falls, 3.41; Rochester, 3.08; Schenectady, 2.20; Syracuse, 2.75.

40704. Marble chips and/or crushed marble, minimum weight 70,000 lb., Swanton, Vt., to St. Paul, Minneapolis, Minn., 40; Milwaukee, Wis., Chicago, Ill., 27; St. Louis, Mo., 31; Detroit, Mich., Cleveland, O., 22; Cincinnati, O., 26; Flint, Mich., 23; Grand Haven, Mich., 25. Reason—To establish a reasonable basis in order to permit of handling a substantial volume of tonnage which would otherwise be disposed of locally by highway.

### Trunk

Sup. 1 to 35360. Stone chips or granules (roofing granules), C. L., minimum weight 50,000 lb., from Texas and Cockeysville, Md., to Park Place, Penn., \$2.77 per net ton, in lieu of present 6th class rate.

Sup. 1 to 35400. Zircon sand or zircon ore, C. L., minimum weight 56,000 lb., to Detroit, Mich., from stations shown in Note 60 of N. E. F. A. Agency Tariff 26-B, I. C. C. 260, taking Rate Group Boston and New York, 28c; taking Rate Group Lowell and Manhattan, 27c per 100 lb.

35410. Slag (a product of lead furnaces) in box or open-top cars, C. L. (See Note 3), from Buffalo, Niagara Falls and Suspension Bridge, N. Y., to Newark, N. J., 21c per 100 lb.

M-3594. Gravel, sand, slag, stone, crushed, coated with oil, tar or asphaltum, in bulk in open top equipment, C. L. (See Note 2), from Greer, W. Va., to Huttonsville, W. Va., \$1.55 per net ton.

M-3595. Crude gypsum rock, C. L. (See Note 2), but not less than 80,000 lb., from Tremley, N. J., to York, Penn., \$2 per net ton.

M-3597. To establish various rates on limestone, unburnt, ground or pulverized, C. L., and stone dust, C. L., minimum weight 60,000 lb., from Patterson, Dover Plains and Wingdale, N. Y. Group A, and Pleasantville, N. Y. Group B, to points in C. F. A. territory.

35419. Refuse fuller's earth, C. L. (See Note 2), from Marcus Hook, Philadelphia, Penn., Bayonne, N. J., and Olean, N. Y., to Columbus and Dayton, Ohio, Indianapolis, Ind., Holland and Saginaw, Mich., rates ranging from \$2.40 to \$3.50 per net ton.

M-3605. Gravel, sand, slag, stone, crushed, coated with oil, tar, asphaltum\* in open top cars, C. L. (See Note 2), from Dunbar, Penn., to West Hamlin, W. Va., \$2.20 per net ton.

M-3607. Slate, crushed, dust or ground, C. L., minimum weight 50,000 lb., from Easton, Easton (Bushkill Station) and Easton (13th Street), Penn., to Boston Stations, Mass., 18c per 100 lb.

M-3608. Limestone, crushed or broken, ground or pulverized, C. L., minimum weight 60,000 lb., from Pleasantville, Patterson, Wingdale and Dover Plains, N. Y., to points in New Jersey on the P. R. S. L., rates ranging from \$1.95 to \$2.35 per net

\*Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity shipped, the shipper to so specify on shipping orders and bills of lading.

ton. Reason—Rates are based on I. C. C. Docket 25220 joint haul scale.

M-3615. Crude quartz, C. L. (See Note 2), from Bedford Hills, N. Y., to Troy, N. Y., 9c per 100 lb.

M-3617. Talc, crude, lump or rough slab, C. L. (See Note 2), from Emeryville, N. Y., to Montreal, Que., \$2.25 per net ton.

35430. Stone, natural (other than bituminous asphalt rock), crushed, and stone natural (other than bituminous asphalt rock), crushed, coated with oil, tar or asphaltum\*, C. L. (See Note 2), from Tarrytown, West Haverstraw, New Hamburg, South Bethlehem, Feura Bush, Green Island, Schenectady, South Amsterdam, Little Falls and Utica, N. Y., to points on the Long Island Railroad, rates ranging from \$1.70 to \$3.30 per net ton.

35435. To add nepheline syenite, crude or ground, C. L., minimum weight 60,000 lb. to exceptions to Official Classification providing for Class 21 rating on feldspar and cornwall stone between points in O. C. territory, including extended Zone "C" in Wisconsin.

35437. Stone crushed, and screenings, in straight or mixed carloads (will not include agricultural limestone or ground limestone, unburnt; fluxing stone or firestone, or stone coated with oil, tar or asphaltum). (See Note 2), from Monocacy, Penn., to Binghamton, N. Y., \$1.90 per net ton.

35453. Sand, carloads (See Note 2), from points in Southern New Jersey to Brockville, Ont., 26½c per 100 lb.

35455. Refuse fuller's earth, C. L. (See Note 2), from Oil City, Warren, Bradford, Butler and Heath, Penn., to Columbus, Ohio, Indianapolis, Ind., Holland and Saginaw, Mich., rates ranging from \$1 to \$3 per net ton.

35468. Quartz, rough flint, C. L., minimum weight 50,000 lb., from Piney River, Va., to Suspension Bridge, N. Y., \$4 per net ton.

35469. To cancel commodity rates on stone refuse, stone, scrap, C. L., from Albion, Cambria, Eagle Harbor, Fancher, Gasport, Holley, Lockport, Medina and Middleport, N. Y., to various points on the N. Y. C. R. R., rates ranging from \$1.20 to \$4.50 per net ton.

35475. Sand and gravel (other than ground) in closed cars, or in open top cars with tarpaulin, C. L., and sand, naturally bonded molding, in open top or closed cars, C. L. (See Note 2), from Flanders, N. J., to Florence and Burlington, N. J., \$1.40 per net ton.

### Central

49144. To cancel rates in P. R. R. Tariffs 124-B and 125-A, on limestone, stone, etc., from Muncie, Ind., New Paris, Sandusky, Ohio, Muskegon, Mich., Gosport, Romona, Ind., Marble Cliff, Piqua, Ohio, and St. Louis, Mo., to points in Indiana, Ohio, Michigan, Illinois, Chester, W. Va., and Mason City, Iowa. Classification basis to apply.

49145. To establish on sand (except industrial) and gravel, C. L., from Cambridge City, Ind., to Cowan, 35c and Muncie, Ind., 40c per net ton.

49368. To establish on carbonate of calcium or lime, in Official Classification, C. L., minimum weight 40,000 lb., from Painesville, Akron and Barberton, O., to St. Paul and Minneapolis, Minn., 37c.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

49371. To establish on roasted dolomite, C. L., minimum weight 60,000 lb., from Narlo, O., to Boston, Mass., Rockland, Me., and points taking same rates, 365c per net ton.

49380. To establish on: (a) Sand, naturally bonded molding, in all kinds of equipment, C. L.; sand (except naturally bonded molding, ground or pulverized sand), in closed equipment, C. L.; (b) sand, ground or pulverized, in all kinds of equipment, C. L., and (c) sand (except naturally bonded molding, ground or pulverized sand), in open top equipment, C. L.; (See Note 3), but not for closed and open top cars of less marked capacity than 60,000 lb. and 80,000 lb., respectively, from Copely, O., to Fortville, Ind.: (a) 210c, (b) 231c and (c) 200c per net ton.

49382. To establish on dolomite, roasted (refractory dolomite, in granular form, treated or untreated, clinkered and burned to a dead state), C. L. (See Note 3), from Narlo, O., to Chattanooga, Tenn., 421c per net ton.

49384. To establish on slag, commercial or granulated, in open top cars, C. L. (See Note 3), from Cleveland, O., to Warren, Penn., 140c per net ton. Via N. Y. C. R. R.

49406. To establish on carbonate of calcium or lime, C. L., minimum weight 40,000 lb., from Painesville, O., to Birmingham, 44c; Gadsden, Ala., 42c; Atlanta, Ga., 43c; Chattanooga, 39c; Memphis, 41c, and Nashville, Tenn., 35c.

49409. To establish on: (a) Agricultural limestone, unburnt, in box cars, minimum weight 50,000 lb., as described in P. R. R. Tariff 130; (b) agricultural limestone, unburnt, and agricultural limestone screenings, in open top cars (See Note 3), as described in P. R. R. Tariff 180B; and (c) crushed stone and stone screenings, in open top cars, straight or mixed carloads (See Note 3), as described in P. R. R. Tariff 127-A, from Gibsonburg and Woodville, O., to Minerla, O., (a) 150c, (b) and (c) 125c per net ton.

49416. To establish on crushed stone, in open top cars, C. L., from Lima, O., to Maedra, O., 115c per net ton.

49417. To establish on slag, crushed, or crushed commercial (other than granulated), in open top cars, C. L., from Jackson, O., to Congo, 95c; Drakes, 90c; Buckingham, Hemlock, Carrington and Shawnee, O., 95c per net ton.

49427. To cancel rates on stone, crushed, slag and gravel, coated with oil, tar or asphaltum\*, in open top equipment, C. L., from Middlepoint, O., to all stations in Ohio, scale basis published in Item 7540 of C. F. A. L. Exceptions 130-X.

### Southern

Amdt. 1 to 13276. Amended to suggest rates on mica schist, dry, ground, or screened, including unground mica screenings from clay or kaolin washings or residue, C. L., minimum 60,000 lb., from C. C. & O. R. R. stations in Note 40 of C. C. & O. R. R. I. C. C. 129 taking Group 5, except Penland and Spruce Pine, N. C., and Black Mountain R. R. stations to Ensley, Mobile, Ala., New Orleans, La., and Oakland City, Ga., on basis of 25% of I. C. C. Docket 15879 first class rate.

13477. Granite or stone, crushed or rubble, C. L. (See Note 3). Establish 48c net ton, from Greystone, N. C., to Durham, N. C. (Intrastate only). Expires June 30, 1937.

13481. Limestone or marble, crushed, granulated, ground or pulverized, C. L. Cancel specific point-to-point rates from Falling Rock, Va., to points in S. F. A. territory published in Section 1, S. F. T. B. Tariff 219-B. Mileage scale to be applied in lieu thereof.

13483. Mica schist, dry ground screened, C. L., min. 60,000 lb. Establish following rates in cents per net ton from Clarkesville and Tiger, Ga., to Baltimore, Md., 521; Bound Brook, N. J., 641; Chicago, Ill., 671; Cincinnati, O., 620; East St. Louis, Ill., 700; Erie, Penn., 740; Joliet, Ill., 677; Manville, N. J., 641; Philadelphia, Penn., 580; St. Louis, Mo., 700; Vandalia, Ill., 700; York, Penn., 616.

13491. Chert, C. L. (See Note 3). Establish 190c net ton from Wilcox, N. C., to Hiawassa, Va.

13593. Phosphate rock, not acidulated (acid phosphate) nor ammoniated, and limestone, phosphatic, straight or mixed C. L. Min. 40,000 lb., or, if less, (See Note 1). Establish 248c net ton, from L. & N. R. R. and N. C. & St. L. Ry. stations in the Mt. Pleasant-Centreville, Tenn., district as per Item 10, Group 1, of L. & N. R. R. G. F. O. No. 30C, and Item 18454 of S. F. T. B. Tariff 705A, to Mobile, Ala., for export.

13646. Bituminous asphalt rock, asphaltic sandstone (processed or natural), C. L., as per Item 40, S. W. L. Tariff 99-C. Establish rates from Kentucky producing points on the L. & N. R. R. and I. C. R. R. to points in Missouri on and south of the line of the St. L.-S. F. Ry., St. Louis, Mo., to Kansas City, Mo. (not inclusive), on same basis now observed to Southwestern territory generally.

## Western

E-41-191. Stone, crushed, C. L. (See Note 2), but not less than 40,000 lb.; when loaded in hopper bottom ore cars, 75,000 lb. From Pine Hill, Mich., to Marseilles, Ill. Proposed—270c per net ton.

D-41-192. Stone, crushed, C. L. (See Note 3). (Rates in cents per net ton.)

From	Red Granite, Wis. Lohrville, Wis.	Prop.
To Russell, Ill., to		
Wilson, Ill. ....	140	
to		
Rondout, Ill., to		
Forest Glen, Ill. ....	150	
Belden, Ill., to		
Libertyville, Ill. ....	150	
From Albemars, Wis.		
To Russell, Ill., to		
Wilson, Ill. ....	140	
Rondout, Ill., to		
Forest Glen, Ill. ....	150	
Belden, Ill., to		
Libertyville, Ill. ....	140	

C-41-193. Gravel, gravel pit stripings, also gravel, crushed (See Note 3), but not less than 60,000 lb., from Jedburg, Mo., Pacific, Mo., and Yeatman, Mo., to Lowell, Ind. Proposed—\$2.63 per ton of 2000 lb.

C-41-194. Stone, ground, C. L. (See Note 3), but not less than 40,000 lb. From Hannibal, Mo., Marblehead and Quincy, Ill., and White Bear, Mo., to Cedar Rapids, Ia. Proposed—to allow regular group rate of 190c per ton of 2000 lb. in Item 2405 of same tariff (which carries same minimum weight as Item 4125) to apply. Marblehead, Ill., to be added as originating point in Item 2495 of Tariff 50-P, on account of being located between Quincy, Ill., and Hannibal, Mo.

## Southwestern

10091. To publish a commodity rate of \$5.25 a ton of 2000 lb. (See Note 2) on stone, broken or crushed (ranging in size up to 200 lb. weight), from Berthoud, Colo., to Houston, Tex., via routes in connection with the C. & S. Ry. through Sixalfa, N. M.

10097. To establish rate of 186c per ton of 2000 lb. on agricultural limestone, car-

loads (See Note 3), from Valmeyer, Ill., to Springfield, Mo., and necessary intermediate points.

10155. To establish Class 30 rating, minimum weight 18,000 lb. on vermiculite, other than crude, for application from, to and between points in Southwestern and Kansas-Missouri territories.

10171. To establish the following rates in cents per ton of 2000 lb. on feldspar, carloads:

To	(*)	(†)
St. Louis, Mo. ....	(3) 650	(3) 550
East St. Louis, Ill. ....	(1)	(1)
Alton, Ill. ....	(5) 525	(5) 480
Chicago, Ill. ....	(3) 800	(3) 730
Peoria, Ill. ....		
Minneapolis, Minn. ....	(3) 830	(3) 760
St. Paul, Minn. ....		
Blackwell, Okla. ....		
Bristow, Okla. ....		
Henryetta, Okla. ....	(4) 525	(2)
Muskogee, Okla. ....		
Poteau, Okla. ....		
Caney, Kan. ....		
Pittsburg, Kan. ....		

(\*) Proposed rate from Lobo, Marfa and Valentine, Tex.

(†) Proposed rate from Llano, Kingsland and Fredericksburg, Tex.

(1) Applicable only on traffic destined to points east of the Illinois-Indiana state line.

(2) To Caney and Pittsburg, Kan. Rate same as proposed is now in effect to other points named.

(3) Minimum weight marked capacity of car.

(4) Minimum weight 50,000 lb.

(5) Minimum weight 80,000 lb.

10199. To establish from Moyers, Okla., to Birmingham and Mobile, Ala., rates of 308 and 298c per ton of 2000 lb., respectively, on broken stone ranging in size up to 200 lb. weight, carloads.

10213. To establish rates of 48½c per 100 lb. to Clinton, Drayton and Palmerton, Ont., and 49c per 100 lb. to Brussels, Clifford and Mt. Forest, Ont., Canada, on oyster shells, carload, from Berwick, Houma and Morgan City, La.

10270. To establish rate of 186c per net ton on ground limestone, carloads (See Note 3), from Valmeyer, Ill., to Springfield, Mo.

## Illinois

6665-2. Gravel, etc., C. L., as described in Item 175 of M. & O. R. R. Trf. 12450, I. C. C. B-905, from Elco and Gravel Pit, Ill. (See Note 3); to Cairo, Beech Ridge, Cache and Hodges Park, Ill., proposed, 60c per net ton.

## Transcontinental

19042. Mica (ground, pulverized, rough cobbed or book), mica schist and kyanite, C. L., W. B.: Request for C. L. rate \$1 per 100 lb., minimum weight 80,000 lb. from Group L to Pacific Coast. Tariffs 1 and 4.

## I.C.C. Reports

16296. Pebble lime to Edge Moor, Del., and Phoenix, N. J. By division 2. Carriers authorized to maintain over existing routes a minimum 80,000 lb. points in Pennsylvania, a rate of not lower than \$1.90 a net ton, Maryland, Virginia and West Virginia to Edge Moor and Phoenix, without observing the long-and-short haul part of section 4.

16138. Slag, gravel, crushed stone to south Atlantic ports, embracing also No. 16192, as amended. By division 2. Rail carriers parties to Pope's I. C. C. No. 1635, authorized to establish over existing interstate routes, rates from points in Alabama, Georgia, and South Carolina and from points intermediate thereto from which the rates from origins specified were observed as maxima, to Charleston, S. C., Savannah, Ga., and Jacksonville, Fla., without observing the long-and-short haul provision of

section 4 subject to intermediate and circuity limitations. Relief was temporarily authorized by fourth section order No. 12168 and supplements thereto.

## Sand Reparation Suit

The H. B. Smith Company has filed suit in the federal court for the southern district of New York to compel the New York, New Haven & Hartford and other carriers to pay reparation of \$22,001.91 awarded by the Commission in No. 22476, H. B. Smith Co. vs. New York, New Haven & Hartford et al., 213, I. C. C. 63, decided December 2, 1935. The suit was filed by Raphael Blank for the H. B. Smith Company.

In the case before the Commission it was alleged that the joint international rate charged on many carload shipments of lake or beach sand from Muskegon, Mich., to Westfield, Mass., was unreasonable. The shipments moved partly through Canada over routes designated by the shipper. The railroads offered testimony to show that in the reparation period, they published and maintained rates applicable from Muskegon to Port Huron, Mich., and Sarnia, Ont., on the international boundary line, and from points of reentry of the shipments into the United States to Westfield. The railroads objected to any award of reparation on shipments over the routes through Canada on the ground that the Commission had no jurisdiction on shipments over routes through Canada. The Commission held there were no rates specifically to and from the international boundary, and that therefore it had jurisdiction to determine the lawfulness of the rates in question.

## I.C.C. Decision

The Commission, in a report in No. 22907, industrial sand cases, 1930, on further hearing, has modified prior findings, affirmed some, awarded reparation and given fourth section relief authorizing carriers having long routes to establish rates over such routes to meet those of the short routes, subject to the 33 1/3, 50 and 70% circuity limitations. Reparation was awarded on the so-called Prairie Pipe Line formula, as modified in Manolia Petroleum Co. vs. C. R. I. & G., 151 I. C. C. 705, that is, on a basis between the rate charged and those prescribed for the future.

## Oppose Freight Rate Increase

THE TRAFFIC COMMITTEE of the National Industrial Sand Association met January 8 to formulate a plan of procedure by which the association could guide itself in presenting a statement to the Commission opposing any increase in rates on industrial sand.

## Shipments Keep Up

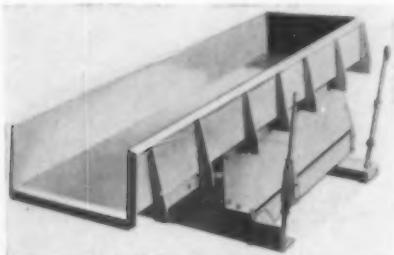
PORTLAND CEMENT shipments to the end of January were much in excess of earlier expectations. The unusually mild weather which has carried over from the two final months of 1936 has greatly stimulated demand in that it has allowed the continuance of construction operations entailing the use of masonry in sections of the country where normally activities are largely suspended at this time of the year. Also, the continued upsurge in building in the South and other areas not affected by frost has accelerated shipments.

# NEW MACHINERY AND EQUIPMENT

## Vibratory Feeder

**S**YNTRON CO., Pittsburgh, Penn., has recently placed on the market a vibratory feeder conveyor, "Vibra-Flow," consisting of a trough, flat, open or closed, or circular tubular type, reciprocated at high speed through a very short movement by powerful pulsating electro-magnets.

Bulk material flows through the trough or tube at a speed proportional to the amplitude of vibration, which is controlled electrically through a rheostat. This control is said to permit variation in flow from a dribble to a maximum of 50 tons per hour.

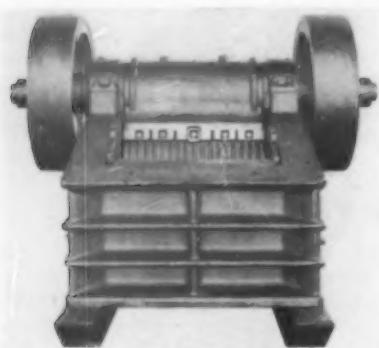


Vibratory feeder conveyor

The conveyor is said to require little power and to operate on an ordinary 110-volt, single-phase a.c. lighting current. It is arranged for overhead support by wire cables and provided with four turnbuckles for adjustment to the desired position. It operates in a horizontal or slightly down-slope position.

## Roller-Bearing Crushers

**I**OWA MANUFACTURING CO., Cedar Rapids, Ia., is marketing a complete line of SKF roller-bearing equipped, force-feed type, jaw crushers. This is in addition to its regular line of plain bearing jaw crushers and plain and roller-bearing roll crushers. The new jaw crushers are said to require field lubri-



Crusher built for rugged and safe operation

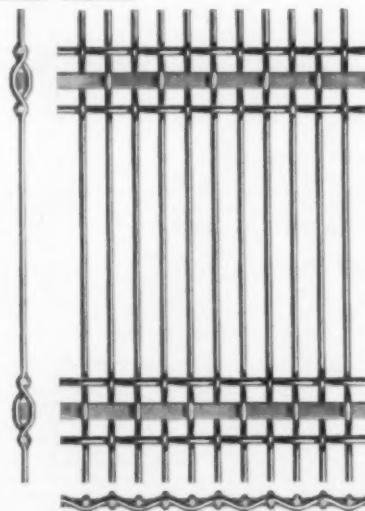


Combination gravel crushing, screening and loading plant mounted on truck

cation of the bearings only every six months. The bearings are claimed to be tightly sealed against dust and to be extra large for the job.

## Long-Mesh Woven Wire

**L**UDLOW-SAYLOR WIRE CO., St. Louis, Mo., has brought out an improvement in its long-mesh, woven-wire screen cloth, "designed to give all the advantages of maximum open screening area inherent in the long-mesh type, but eliminating the fault of stretching under tension."



Non-stretching long-mesh cloth

In this new "Sta-Tru" type of screen, on which patents have been applied for, the tensioning members of the screening equipment exert their pull on straight, uncrimped stay-bars of high tensile strength, which are woven into the screen in combination with two or more crimped spacing wires that maintain the longitudinal screening wires in their proper relationship and spacing.

## Portable Plant

**U**NIVERSAL CRUSHER CO., Cedar Rapids, Ia., announces a new "Dual" gravel crushing, screening and loading plant. It has the following standard equipment mounted on a heavy duty, goose-neck type, six-wheeled truck with 12 pneumatic tires—a No. 936 jaw crusher, a 30x16-in. roll crusher, a 4x8-ft. double-deck gyrating screen, a sand rejector. A 24-in. by 52-ft. feeder belt conveyor, an 18-in. by 52-ft. delivery belt conveyor, and a 21-cu. yd. steel jackleg bin complete the assembly.

## Streamlined Dump Body

**E**ASTON CAR & CONSTRUCTION CO., Easton, Penn., has developed what is described as "a radically new design in open-end, hydraulic-hoist, truck dump bodies." It is an all-steel body using high carbon plate surfaces and a structural frame in arc-welded and riveted assembly. The capacity of the body illustrated is 7 cu. yd., shaped, or 9 cu. yd., heaped.



Dump body of new structural design



*Sieve Shaker of new type*

### Testing Sieve Shaker

**N**EWARK WIRE CLOTH CO., Newark, N. J., announces a new "End-Shak" testing sieve shaker for determining sizes of fine materials. The combined reciprocating and turning motion of this shaker is developed from the method employed and recommended by the National Bureau of Standards.

The Bureau recommends that about 150 strokes per minute be employed, revolving the sieves approximately one revolution per minute. In that test no strenuous motion is applied to the sieve—simply a light tap at the end of each stroke by the free hand. This allows the material being tested to roll over the sieve cloth, keeping it in constant contact and giving it every possible opportunity to find an aperture.

It is tedious and difficult to do this manually. Hence the development of this machine. It is called "End-Shak" because the fundamental idea behind it is to give to testing engineers a method which will put through any given testing sieve or sieves, in the shortest interval, all sample material that would eventually pass.

The machine weighs 145 lb., including the motor and auto time switch. The shipping weight is 175 lb. It is 32 in. high; the base, overall, 22 by 18 in. A standard  $\frac{1}{4}$ -hp. motor is used; 110-v.; 60-cycle a.c.; 1750 r.p.m. Special motor equipment is furnished if desired. The standard auto time switch which goes with each machine automatically controls the period of the test. The machine is designed for 8-in. diameter testing sieves, and is adjustable to hold any number of sieves from 1 to 13 inclusive.

### Clamp for Pipe-Leaks

**M**. B. SKINNER Co., South Bend, Ind., is marketing a line of easily applied clamps for stopping leaks in pipes of all sizes which carry gases or liquids. The clamps are put on while pipe lines are in service except upon extremely high-pressure lines.

Specifications for these clamps, it is claimed, require a metal composition of high tensile strength and uniform density and hardness. The design is intended to meet higher pressure requirements currently being adopted. Every clamp is said to be tested under a pressure of 3000 lb. before it leaves



*Clamp for permanently stopping pipe leaks*

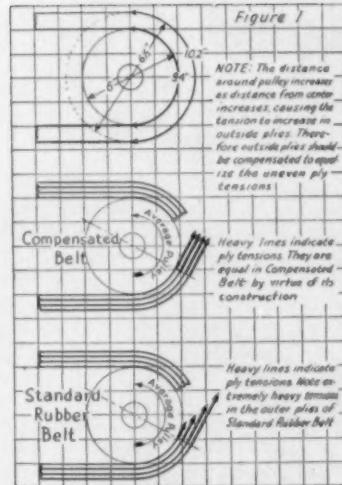
the factory. The clamps are invaluable when leaks show up in steam, hot water or vapor pipe going back into service or when frost splits or bursts exposed pipes.

### Arc Welding Laboratory Opened

**L**INCOLN ELECTRIC CO., Cleveland, Ohio, recently established a research institution dedicated to encouragement of study of arc welding industry. Non-commercial and non-competitive, this new fund has been named "The James F. Lincoln Arc Welding Foundation" in honor of the pioneer work of the company's president in promoting arc welding and in perfecting its equipment. Principal direction of the Foundation's work will be under Dr. E. E. Dreese, head of the Department of Electrical Engineering at Ohio State University.

### Rubber Goods

**M**ANHATTAN RUBBER MANUFACTURING DIVISION, Passaic, N. J., of Raybestos-Manhattan, Inc., announces two new styles of "Condor" compensated belt, known as "F" and "B." Both have the patented compensated principle of equalized ply stresses at the arc of contact, but are especially designed for conditions which require some slip rather than an extremely high coefficient of friction for low tension operation.

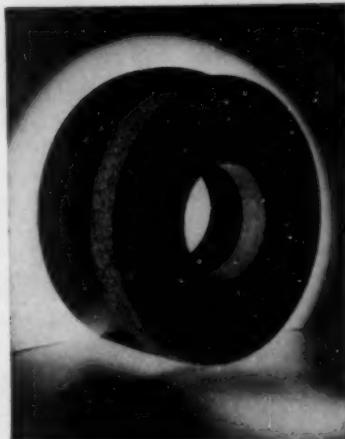


*Diagram of the principle of belt stress equalization*

Style "F" has a red friction pulley surface and is designed for use where a slight starting slip is desired, while Style "B" has a bareback, untreated duck, pulley surface, and is built for conditions calling for a greater slip, or where slip is essential, as in the case of Winder drives. There are no differences between the construction of these belts and that of the regular Condor compensated low-tension belt except for the pulley surface.

### Finishing Mill

The same manufacturer has recently developed a new finishing wheel to meet the need of a fine grit wheel with a slight "cushion" effect to follow up grinding operations. Although slightly flexible and having some "give," this wheel is not soft enough to conform to irregular surfaces like cloth polish wheels. It is therefore limited to work having a flat or relatively even curved surface. Its operating speed should not exceed 6,000 surface feet per minute.



*Finishing wheel for fine grit*

# Digest of Foreign Literature

By F. O. Anderegg.

Consulting Specialist in Building Materials, Newark, Ohio

*Porosity and Permeability of Concrete*—This problem has been of paramount interest in the studies of the famous French concrete expert, Robert Feret, for nearly a half century. His experience at the Laboratory of Bridges and Roads at Boulogne has led him to conclude that tests on cements for their resistance to salt solutions when obtained by permitting the solutions to filter through the concrete specimens do not give reliable results because of frequent lack of parallelism between porosity and permeability. The former is defined as the total space occupied by liquids and gases. The narrower and more abundant, the greater the capillary action and the greater the penetration of salt solutions into the interior. Permeability is defined as the amount of liquid or gas which will flow through a given cross-section in a given time under unit pressure differential. This effect depends upon the number of communicating pores and upon their size. As early as 1892 Feret had pointed out the difference between these two properties, and with certain gradings these may be very far apart.

Within the limits of workable mixes, regardless of the nature of the cement used, or of the richness of the mix, or of the consistency, and regardless of the nature of the coarse sand, the density of freshly prepared mortar and the strength of the hardened concrete are highest for compositions close to 78 parts of coarse-grained sand and 22 of cement plus rock dust, with little or no sand of intermediate sizes. The laws of gap grading, formulated first by Feret nearly 50 years ago, are confirmed. On applying them to concrete, it is true that under certain conditions, the segregating tendency of the largest aggregates is at times inconvenient, especially on long hauls. But where concrete is tamped or vibrated into place, a practice of ever increasing frequency, there is little to fear.

The chemical nature of the cement is only a secondary factor in the tendency of concrete to disintegrate in contact with corrosive salt, in spite of the commonly held hypothesis ("abstraction") to the contrary. The principal factor governing decomposition is the abundance of capillary openings, which may be evaluated by making porosity determinations. It has been often demonstrated, and confirmed by Feret, that the porosity increases rapidly as more gaging water is used, whether necessi-

tated by the nature of the large aggregate, by the amount of the fine sand, especially by the fine powder and its nature, or by the desired consistency. The choice of materials and their proportions should be directed towards reduction of the amount of gaging water to a minimum compatible with obtaining a concrete properly held together and easy to work, within the possibilities contained in the specifications governing the work.

In particular, the addition of rock powders, which may help to improve the workability of concrete low in cement and in fine sand, should be controlled so as to require the addition of very little more mixing water, especially when the powder has no pozzuolianic activity, which would permit it to act in concert with the cement in fixing part of the added water.

The cement used might well be chosen for minimum tendency toward disintegration and should evidently set up within a reasonable time. Sufficient cement should be present so that, when exposed to aggressive solutions, the bulk of the pores should have become obstructed by the insoluble compounds formed by previous action of water on the cement and resulting from the carbonation of a large part of the lime set free. Such lime has been gradually brought to the surface as the concrete dried out and forms there, on carbonation, a protective crust which reduces the movement of the aggressive solutions through the concrete. (These ideas of Feret are regarded by the reviewer, in light of his experience, as eminently sound.) *Annales des Ponts et Chausses* (1936) No. 2, p. 11.

*Pozzuolianic Admixtures to Portland Cement*—Materials added to portland cement to fix the lime set free during hydration are capable of changing appreciably the volumetric composition and strength of the resulting mortar or concrete. One of their chief effects is to reduce the porosity of the concrete and so increase its resistance to sea water. This problem has been given attention by Cesare Zamboni. He finds that at least a year is required before one is able to evaluate pozzuolianic activity with any certainty under ordinary conditions, but that a similar effect may be obtained by maintaining the specimens at 70 deg. C. for 24 hours. It is obviously hopeless to attempt to fix all the lime set free during the hy-

dration of portland cement as this would require 40 parts of portland to 60 of the best pozzuolianic materials, because of the large part (80%) inactive in the latter. The combining power of the pozzuolan may be determined by the difference between the acid soluble constituent after storing cold and at 80 deg. C. for 24 hours. One cannot expect to fix more than half of the lime. Determination of the porosity is the most convenient and best way of evaluating the effectiveness of the admixture, while test specimens made by pounding in mixes of earth-dry consistencies give almost no information of the practical value of such additions. A study of ancient Roman concrete shows that the porosity is the most important factor in the durability of concrete. *Il Cemento Armato, Le Industrie del Cemento*. (1936) 33, No. 9, p. 155.

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*Hot Cement*—Experiments concerning the effect of portland cement ranging in temperature from room to 160 deg. F. on the properties of concrete made therefrom and on the setting time of the neat cement were reported by L. Kruger to the German Portland Cement Association at its last meeting. He was unable to find any serious effects, provided the water and aggregate were at room temperature; as a matter of fact, a 25% increase in flexural strength was observed using the hottest cement. *Zement* (1926) 25, No. 43, p. 741.

• • •

*Quality in Asbestos Cement*—A few experiments are described by E. Lechner in which he repeated previous tests by Hans Kuhl and Ferrari on an asbestos cement developed by G. Morbelli. In this asbestos-cement about  $\frac{1}{2}$  to  $\frac{3}{4}$  of the cement is replaced by finely ground silica; and the products, after forming in the standard manner, are cured under steam pressure, much as sand-lime brick are cured. Tests were made on sheets from the same machine with and without the replacement and hardening by steam. The specimens were stored in a pile for  $1\frac{1}{2}$  months to allow the portland cement in the usual sheets ample opportunity to cure. On treating with 10% nitric acid and with 5% hydrochloric acid, about 5 times as much was leached from the straight portland cement sheets. On storing in linseed oil the portland cement sheets were badly attacked, while the Morbelli sheets were perfectly sound. Storage of the latter in 15% solutions of magnesium, sodium or ammonium sulfate for  $1\frac{1}{2}$  years caused no visible evidence of disintegration. *Zement* (1936) 25, No. 46, p. 801.

# Concrete Products

## Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

### Section of Rock Products

#### LARGER MARKETS FOR CEMENT AND AGGREGATES

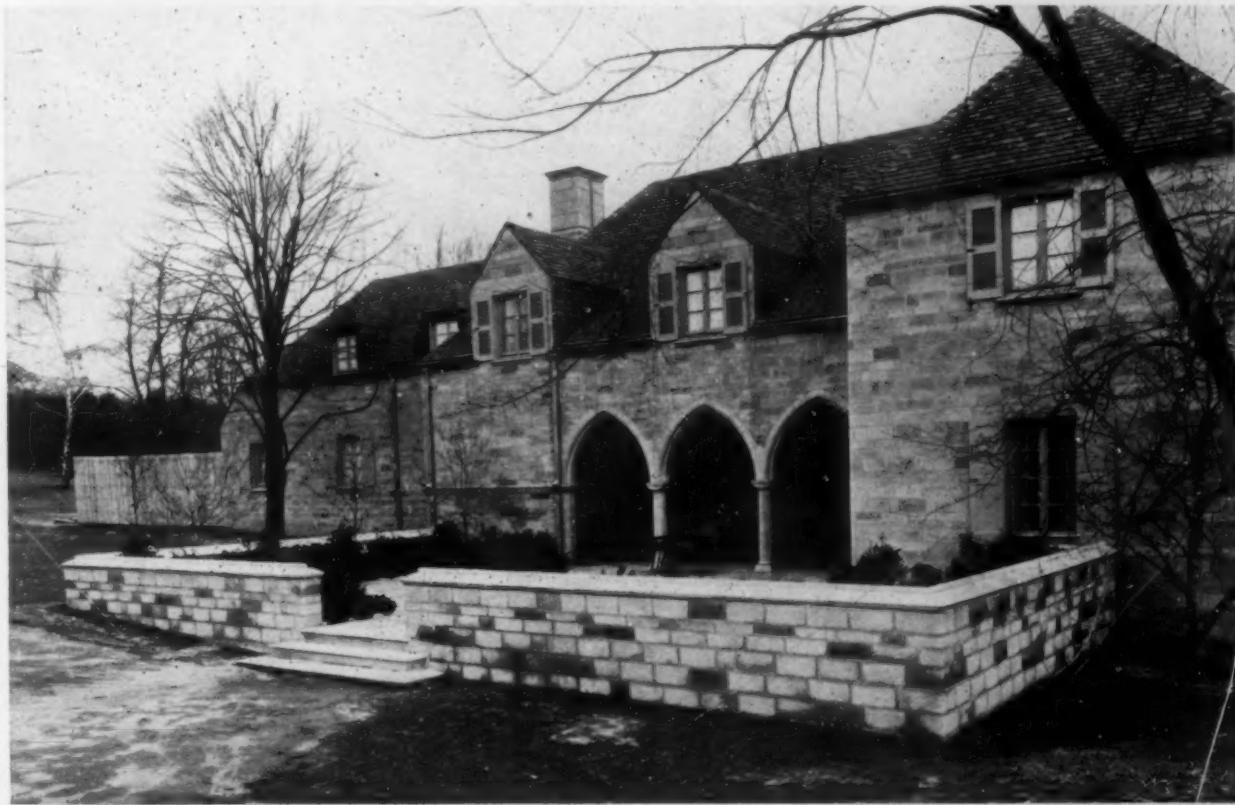
MAKING SALESMEN out of concrete products manufacturers and the general improvement in building have combined to take the industry out of the "down in the basement" classification; have established these products as important building materials. Creative salesmanship and coöperation between members of the industry and with builders and contractors have definitely proven the merits of concrete masonry units for above ground construction.

Concrete products have always been known to possess qualities of durability, permanence, fire-safeness, resistance to termites and low sound absorption; yet only recently,

and particularly in 1936, has a concerted effort been made to tell the public about it.

What has happened? Concrete products are finding their place in the present movement toward low-cost homes to the extent of 8% of all homes built in 1936. Demands are taxing the capacities of present plants, and every effort must be made to meet future increasing demands. Yet the surface has been barely scratched.

The market is definitely there. The products are becoming recognized. Plants are being made over to permit a rapid turnover. A better job of "creative selling" and coöperation should do the rest.



Brighton Concrete Products, Belmar, N. J., furnished 17,500 ashlar units for this new lodge on the H. N. Strauss estate at Middletown, N. J.



**WHEN** the whining shriek of the fire siren rings in your ears, how good it is to know that your loved ones are safe in the shelter of a concrete home! For concrete won't burn. It stands secure against fire just as it resists the insidious boring of termites, the destructive force of storms and the slow onslaught of decay.

Such protection is undoubtedly worth a lot of money—and you quite justified in assuming, for example, a \$6500 price reduction adds to the payment per month to the payment than made small expenditure is more than made up by savings in slower depreciation and lower upkeep costs.

Of course your concrete home can be in any architectural style or any color you choose. And it will be a livable home that will remain free from crowing faults. It will be

#### How to Get a Concrete Home

Ask a nearby concrete products man or concrete contractor for names of architects and builders experienced in concrete.

Tell the architect you select that you want concrete walls, floors and a fire-safe roof.

Have your plans figured by one of the rapidly growing number of builders and restorers who have built concrete homes or who are specializing in this type of construction. As a rule you will get the best bid and the best job from a builder experienced in concrete construction. Let nothing shake your determination. Let obtain the best value for your home—building dollar in today's market.

A FIRE-SAFE CONCRETE HOME.

PORTLAND CEMENT ASSOCIATION  
Dept. A-25, 33 West Grand Avenue, Chicago, Illinois

This advertisement appears in February in home magazines going to 3,500,000 families—including YOUR best prospects. The opening gun in an enlarged campaign.

*Cooperate* WITH THESE ADS AND  
DOUBLE YOUR BUSINESS IN 1937

It's up to you! Why stop with foundations only when you can sell the *whole* house—concrete masonry for outside walls, veneer, back-up, partitions; pre-cast floor joists throughout! That is the way thousands of homes will be built this year in communities where concrete products manufacturers are *going after* the business. We'll furnish you national advertising inquiries and other helps—if you'll do your part.

Advertise yourself as the local headquarters for facts and estimates on concrete homes. Tie yourself

in directly with this national advertising. Build a concrete demonstration house, or get a live contractor to do so.

Sell your realtors and speculative builders on featuring the beauty, firesafety and big value of concrete homes.

Double your business this year? Well, why not.

**PORTLAND CEMENT ASSOCIATION**

Dept. 2-45, 33 West Grand Avenue, Chicago, Ill.

# Concrete Products

## OVER THE TOP WITH CONCRETE PRODUCTS

ATTENDANCE AND ACCOMPLISHMENTS at the annual conventions of the National Concrete Masonry Association and the National Cinder Concrete Products Association exceeded by far any previous meetings of the groups. The associations met in Chicago, January 18, 19 and 20, in conjunction with the Cast Stone Institute, the American Concrete Pipe Association, the National Conference of Concrete Contractors and the Concrete Industries Exposition, marking the first time in many years that all branches of the concrete industry have gathered together for their annual meetings.

The success of the affair was beyond even the fondest dreams. Registration for the N.C.M.A. and the N.C.C.P.A. was 537, of which 139 were cinder block manufacturers—breaking all past records by several hundred. Manufacturers of equipment expect to be busy for many months filling the orders closed at the exposition. Many new products and special applications of the old ones were in evidence.

### Associations Merged

Notable at the convention was the merger of the National Cinder Concrete Products Association and the National Concrete Masonry Association under the name of the latter, for the purpose of unified effort in promoting the concrete masonry industry as a whole. The 1938 convention of the new organization was voted to be held in Milwaukee, Wis., one of the outstanding concrete products cities of the country.

Officers elected were Dan F. Servey, Kansas City, Mo., president; Roy McCandless, Detroit, Mich., G. H. Krier, Brooklyn, N. Y., and Louis B. Weatherbee, Buffalo, N. Y., vice-presidents; Walter A. Sherman, Milwaukee, Wis., secretary-treasurer; D. R. Collins, Chicago, Ill., assistant secretary.

"With an immediate need for 1,750,000 new homes and a 63% expansion in the concrete products market last year, 1937 will definitely be a banner year for the cement industry," DAN F. SERVEY, president of N.C.M.A., told members at the opening session of their convention. In reviewing work accomplished in 1936 and announcing plans for 1937, Mr. Servey said that coöperative newspaper advertising by products manufacturers, architects, contractors and finance agencies with national advertising by the various associations have done much toward increasing the use of concrete. He said that this policy will be extended in 1937, and that increasing results can be anticipated. He emphasized the need for coöperating with the nation-wide "Better Housing" movements and recalled the surveys conducted in 1936 which revealed a steadily growing demand for durable, firesafe construction. "For those of us interested in residence construction, 1937 should be a profitable and exciting year," he concluded.

AUSTIN CRABBS, secretary-treasurer of the National Concrete Masonry Association, in his report, showed an increasing membership and improved finances. He recommended that service bulletins of

the type prepared and sent out by "Spec" Collins be mailed regularly by the association and urged, as soon as finances permit, the employment of a full-time paid secretary.

### Housing Market

In the absence of CHARLES LOWER, Bethayres, Penn., his paper, "The Philadelphia Plan," was read by "Spec" Collins, who is quite familiar with the results of the plan. Mr. Collins told of the remarkable job done in 1936 by manufacturers of concrete products in and around Philadelphia, where an advertising agency was hired to prepare the local advertising and handle campaign details, in an effort to double the sales made in 1935.

According to Mr. Lower, it became apparent from the first that materials alone could not be sold. People wanted houses. Therefore the first effort was to make the public, builders and finance agencies concrete "house conscious." This was done, in part, through newspaper, direct mail and placard advertising. Plans for low cost homes were secured and stamped by the Federal Housing Administration as meeting its requirements for insured mortgages. A model concrete ashlar house was erected for the Philadelphia annual Food Show, advertised through the daily papers, and it drew 50,000 visitors.

In summarizing the "Philadelphia Plan," Mr. Lower emphasized the need of making the public "concrete house conscious," the necessity of selling the



Board of directors and officers of the National Concrete Masonry Association. Reading from left to right are H. F. Longenecker, Philadelphia, Penn.; Vice-President L. B. Weatherbee, Buffalo, N. Y.; J. S. Chase, Fort Worth, Texas; Oscar Schmidt, St. Joseph, Mo.; President D. F. Servey, Kansas City, Mo.; Assistant Secretary "Spec" Collins, Chicago; Vice-President G. H. Krier, Brooklyn, N. Y.; Secretary-Treasurer W. A. Sherman, Milwaukee, Wis.; A. H. Kilmer, Des Moines, Iowa. Vice-President Roy McCandless and Ben Wilk, both of Detroit, are missing.

women on the attractiveness of the concrete house, the construction of model homes in convenient locations and the importance of newspaper and placard advertising. It is also planned to use bill-board advertising in Philadelphia during 1937.

Mr. Lower emphasized the importance of constantly contacting architects and contractors to sell them on the concrete house; also, financing agencies such as the building and loan associations, banks, mortgage companies and the FHA must be sold. He said that points to be emphasized are the fire-resistant quality of the concrete house, sound absorption and the fact that the concrete house is cool in the summer and warm in the winter.

#### Carefully-Planned Promotion

To open the second session of the N.C.M.A., J. W. Lewis, cement products bureau, Portland Cement Association, described how the activities of this group dove-tailed with those of the manufacturers. Mr. Lewis said that 14 key cities were designated as 'test tube towns.' Men from the cement products bureau concentrated on these cities to obtain a workable plan for setting up house builders and to determine whether the concrete house could be sold through a single channel similar to that used in promoting the sales of automobiles.

The plan of promotion was outlined by Mr. Lewis. A market survey was made in each of the key cities, designs were developed and plans drawn for concrete houses with fixed prices on the model homes. Each city had its individual problems. For example, some had no well-equipped concrete block manufacturers.

General housing meetings were held, to which builders, architects and contractors were invited. Advertising also was carried in the local newspapers, and exhibits were shown at the housing shows. All inquiries were cleared through the builders. He said that out of 231 inquiries in one city there were 64 immediate prospects. In order to show how effectively manufacturers of concrete products can tie into this program, Mr. Lewis described how the plan operated in Kansas City, where exceptionally fine cooperation was had from the products men.

As a result of the success of this experience, the Portland Cement Association has enlarged its field program and added men especially trained for the promotion of concrete houses. The promotional program was illustrated with a lantern slide showing an organization chart of the field program tied into and working with the activities of community and national advertising programs of the P.C.A. and local groups. Slides also were shown of typical concrete houses that have been built in typical cities. In concluding, Mr. Lewis suggested that manufacturers build up the items that can be sold to a concrete house builder, including joists, lintels, sills, stucco, paints; that the builder be known to have a sales force able to

follow up leads; that service be rendered to the builder.

J. L. STRANDBERG, Kansas City, Mo., told of his experiences, which have brought success in promoting the sale of concrete houses. His talk was illustrated with slides of homes which he has constructed, and he also showed a moving picture film illustrating the progressive steps in building a concrete block house.

Mr. Strandberg said that his greatest surprise was that the concrete products industry is one of the least known so far as the general public is concerned, despite the fact that it is connected with one of the largest industries. He said that as yet the public has not been made to see the value of concrete in the form of beautiful homes, security from fire and termites, plus the lasting qualities of the investment. It was pointed out, however, that the time is approaching when some of these obstacles would be removed; and the future appeared to be bright for manufacturers of concrete products.

The introduction of the concrete joist was credited as being largely the reason for the recent substantial advances in concrete home construction. Mr. Strandberg said that the confidence of the public is being rapidly gained, but that the speculative builder had not as yet been won over. He told of the difficulties encountered in promoting the concrete house in Kansas City. One of the first jobs was a house for a party who was sold on fireproof construction, since his home had just burned down. Bids came in \$3000 higher than they should have been, even at a fair profit to the builder. The problem was solved by securing sub-contractor bids, which was the start of a concrete house building organization.

#### Speculative Building

The next problem was to interest speculative builders by showing them that concrete houses could be built and sold at a profit. The Provident Building and Loan Association of Kansas City, Kan., was sold on the idea of sponsoring concrete houses, when shown the qualities of such houses and how attractive the interiors could be made to look. This organization had room for 13 houses on one plot of land. The Fireproof Home Co. was formed, when reasonable bids could not be secured. Bids were taken on heating plants, electrical work, steel windows, insulation, painting, etc., as well as for the masonry work. The houses were built close to the estimated cost, blocks and joists were sold into a job that could be used for display and a handful of tradesmen was on hand who knew how to build a concrete house.

Mr. Strandberg said that newspaper advertising brought several hundred prospects, which, along with those from the P.C.A. national advertising campaign, were indexed and followed up by salesmen. Now, there are five builders in Kansas City building concrete houses for resale, one of which is a leading realtor with eight salesmen working for

sales of concrete houses. In concluding, he prophesied that the time is not far off when 90% of the homes will be built of concrete masonry, if the good work is continued of organizing and training the different crafts in this type of construction.

#### Chicago Houses Sell

CHAS. JOERN, Chicago, Ill., showed how valuable displays had been to his concern in promoting the sale of concrete homes, in his paper "How Model Homes Sell Concrete Houses." The paper was read by J. Jarvis, in Mr. Joern's absence. Mr. Joern first analyzed the market for homes in the Chicago area, and based his plan on the building needs as shown by this survey. His organization, Wm. Joern and Sons, then engaged a competent architect to assist in designing permanent types of structures and in selecting the materials for construction.

It was decided that the home to be built must be able to stand the test of time. It must be structurally sound and firesafe, attractive in and out, reasonable in cost, low in maintenance requirements and adequate for today's modern living requirements.

These requirements led to the decision to use a system of construction incorporating concrete first and second floors and light weight concrete masonry units for the walls, finished on the outside with cement paint, cement stucco, or as back-up for 4-in. facing of brick or stone.

After developing this standard, a model house was constructed according to the "Joern system." The house was taken enthusiastically by the public and sold in 10 days. Samples were on display throughout the house showing all items used in the basic construction of the building. A fire rate of only 6½ cents per \$100 was given the house by the Chicago Board of Fire Underwriters. The house at the time of building represented a cost of \$7250 and was financed under the F.H.A. 20-yr. payment plan.

Floor construction in this house consists of a reinforced-concrete slab over Junior I-beams, exterior walls are constructed of Haydite building units finished with 3 coats of cement stucco and the interior of the exterior walls was covered with spray-o-flake insulation on which plaster was directly applied.

About 10,000 people inspected this house, said Mr. Joern, and many substantial inquiries were received. Without any sales organization or without any concentrated advertising campaign, in 1936, buildings already completed and those on order represent nearly a quarter million dollars of work, according to Mr. Joern.

In the Lagrange Park development, he said that about \$164,000 worth of business is already on order as the result of the model house. It is Mr. Joern's opinion that practically all building in both single family and multiple-family dwellings will eventually be of these same basic standards and

methods of construction, if not of the same materials.

Some details of construction as used in the Joern system are of special interest. Foundation walls are of concrete, waterproofed on the exterior and with drain tile around the exterior footings. Basement floors are concrete throughout. The exterior walls are of masonry construction, depending on the desired effect, but where brick or stone is used, they are all backed up with light-weight-aggregate concrete building units. Interior partitions consist of non load-bearing tiles.

All lathing throughout the building is of metal. Exterior walls are furred, with an insulation of fibrous material between the furring strips, and insulation on the roof is rock wool. In concluding, Mr. Joern said that he felt that with this ground work done, concrete house construction will bring as much business in 1937 as his concern can handle.

#### New House Types

PAUL T. CAHILL, Toledo, Ohio, architect and builder, told of experiences that led him to specialize in the construction of concrete houses. He said, "primarily, the reason we build houses of concrete is because we believe in them." Mr. Cahill said that his first experience with concrete blocks was in his early days as an architect when he prepared plans for a country church. Construction consisted of double walls with an air space between, the units being exposed on the inside as well as the outside, without plaster. He said that this church, after 30 years' use, continues to present an attractive appearance.

Experience gained during the depression years by Mr. Cahill, when he had the opportunity to observe the condition of various types of buildings, led him to enter business as a builder specializing in concrete construction. He said that in Toledo it is cheaper to build with concrete masonry than with wooden frame construction because lumber costs are higher than in other cities. Concrete floors are also less expensive than wood joist, with a sub-floor and an oak finish floor.

Mr. Cahill said that he was saved time and money during extremely cold weather last winter by using precast cinder concrete slabs for the roofs of modern, flat-roof types of houses. Pouring a slab on the roof at temperatures below 10 deg. above zero was considered hazardous. Accordingly, after the walls and joists were erected, 2- by 4-ft. by 2-in. precast cinder concrete slabs were placed over the joists, joints were filled with pitch and the built-up finished roof was placed. The trend toward concrete houses was credited to the recent Century of Progress Exposition in Chicago and the magazines dealing with homes.

A meeting for the discussion of the design and manufacture of concrete joists and a regular scheduled meeting of the National Cinder Concrete Products Association were held on Monday

evening, January 18. Both of the meetings were in the nature of round table discussions. At the cinder products meeting, there was a discussion on standardization of sizes, curing, shipping age and the crushing and handling of cinders, as well as how the problem of new plants should be handled. At the concrete joist meeting, the experiences of various manufacturers were given on whether to use precast or poured floors with concrete joists. The discussion also embraced various types of reinforcement and kinds of hangers used, including steel strap and wire types.

#### Contractors Join Discussion

Outstanding authorities were on hand in one of the sessions to treat subjects of importance to the manufacturers of concrete products as well as concrete contractors. The contractors met jointly with the N.C.M.A. for this session, with W. G. KAISER, manager, cement products bureau, Portland Cement Association, presiding. In his opening remarks, Mr. Kaiser said that the number of registrants represented the largest aggregation of concrete construction men he had seen in his 20 years in the industry.

#### Prospects in 1937

BERNARD L. JOHNSON, editor of the *American Builder*, in a paper "What Can 1937 Mean to the Concrete Industry", offered some interesting figures on the present market for homes, which indicated an increase of from 65 to 100% in home building volume for the current year as compared with 1936. "The residential building industry," he said, "is on the verge of a boom that will carry it to greater heights than ever before, resulting in a total of from 400,000 to 500,000 new homes to be erected this year. If present ratios are maintained, about 8% of these new houses will be of concrete construction."

He pointed out that the background for the coming boom in residential building can be seen in such basic economic factors as population growth and movement, marriages, demolition and loss of old homes and the ability of people to buy. He believed that the growth of population in the next five years would add a need for 2,250,000 households.

Mr. Johnson said that concrete products manufacturers had the job before them of educating the public to put staunch construction first and gadgets second; with a fight against the use of surface construction. He said that builders should be more 'sales minded'. It was pointed out that 8% of the homes built in 1936 were of concrete construction, as compared to 1.5% in 1935 and that 17% of the home building prospects obtained by the Portland Cement Association were definitely committed to concrete construction and 12% looked with favor upon this type of building.

The success that concrete products manufacturers have had in the past

year have been to quite a degree due to the efforts of the Federal Housing Administration in insuring mortgages for homes. The convention was fortunate in having T. E. DAMM, chief, industries section, F.H.A., at the meeting to tell "How F.H.A. Will Help You in 1937". Mr. Damm said that all indications point toward the greatest program of small home building in the history of the nation, with a need for 750,000 homes annually for the next 10 years, as estimated by economists.

He said that 70% of the home market is in the low cost field, with a necessity for a quality product, in a package form, and for which there exists a definite need. In speaking of the market, he emphasized the existing need for the product, and gave figures to show how enormous this need really is. In the main, the present need is for homes costing less than \$5000, he said, to adequately house the masses whose incomes will not permit a more expensive home. Mr. Damm showed figures on how much the monthly payments would be for various priced homes on set mortgage figures.

#### F.H.A. to Help

He said that the cash and credit situations at present are such as to indicate the existence of an almost unlimited source of capital with which to finance new home construction. Summarizing briefly, he said that the small house is the right type of product, for which there is a large and ready market and unlimited capital. The only other factor needed is man power. Mr. Damm emphasized the need for creative salesmanship. He illustrated just how creative selling can be put to best use in merchandising the small house and told the principal objectives of a demonstration house program.

In introducing the demonstration house program to the local dealer, he emphasized the following facts:

- (1) The erection of such a small house furnishes proof that a properly designed, low cost house is a reality.
- (2) It will demonstrate that such a home is now available to those in the low-income brackets.
- (3) The demonstration home fills the need for a 'packaged' product.
- (4) Visitors should be requested to register to develop a live prospect list.
- (5) The house should be publicized in every possible manner.
- (6) In large communities local building interests should be encouraged for the proper development of subdivisions for small homes.
- (7) Proper connections should be established with mortgage lending institutions for financial assistance.
- (8) Leads should be followed through vigorously.

In concluding, Mr. Damm said that all the facilities of the F.H.A. for financing and planning will be made available to push such projects.

#### P.C.A. Promotional Plans

Speaking on 1937 promotional plans, W. D. M. ALLAN, director of research,

Portland Cement Association, outlined to the convention an intensive drive to develop markets in the housing and small use fields in 1937. He said that the P.C.A. is to spend \$400,000 in its promotional campaign and that it expects with the co-operation of the cement products industry to make the expenditure mutually profitable. He added that the concrete products industry has not started to do the kind of a sales job it should do, and urged that manufacturers do their share by advertising their own business.

JAMES W. CLEARY, vice-president, Roche, Williams and Cunningham, Chicago, advertising agency for the Portland Cement Association, told about the national advertising program and how it is designed to help the manufacturer of concrete products. Mr. Cleary said that 60,000 inquiries were received as a result of the 1936 campaign, of which about 20,000 were genuine prospects. He showed large size drawings of attractive advertisements and samples of the various booklets and other literature prepared by the P.C.A. to help in the campaign to promote the use of concrete products.

"Utility Uses of Concrete Block" was the subject of H. A. DAVIS, South Washington, Va., in opening the afternoon meeting of N.C.M.A., January 19. Mr. Davis said that during the past 12 years his company found that most progress could be made by adapting cinder products to the architectural styles extant, hammering home the great value of these products in resisting the invading forces of nature. As a result, cinder blocks are largely employed in basement walls and as back-up to stone or brick above grade, as well as in large structures as a nailing base in walls and partitions.

He said that about 7,385,000 cinder units, on an 8-x8-x16-in. equivalent basis, were sold in the Washington, D.C., area in 1936, and about the equivalent of 40,000,000 brick in the form of 4-in. back-up. This market was emphasized as having good possibilities in all metropolitan areas if properly developed. In 1936 some 123,000 bbl. of cement, 185,000 cu. yd. of cinders and 350,000 man-hours were required to meet the demand for cinder block in Washington.

#### Large Structures

HERBERT J. VINCENT, Detroit, Mich., in his paper "Selling the Larger Job", emphasized the value of co-operation in production, sales and delivery of a quality cinder block, and the necessity of adequate stock on hand. He said that in his experience in selling large jobs it was found to be important to have the product specified and primarily by the architect. As a result of a good first job, well serviced, a number of large theatre jobs have been sold in Detroit.

Mr. Vincent said that an advantage over competing materials can be had if special shapes and sizes are furnished. In his case, such units are a large part of the business. His company makes

shop drawings of all the special shapes and sizes, furnishes a setting plan and spends considerable time on the job to assist the contractor.

He described some of the advertising methods used by his company, which have proved to be very effective. Post cards printed with the picture of a small, good looking residential house job using cinder block are mailed out monthly to a general mailing list of prospective home builders. Calendars are distributed to individual architects and contractors with a picture of his outstanding development in the frame portion for a personal touch impression.

#### Standard Sizes

President Survey read the paper by BEN WILK, Detroit, on "Why We Should Standardize Unit Sizes". This paper was of particular significance, since in certain parts of the United States there has been a movement to manufacture 18-in. units in place of the standard 16-in. unit to meet some competitive condition. Mr. Wilk discussed the question of standardization from the viewpoint of the public, the products manufacturer and the machinery manufacturers.

From the point of view of the public, standardization means the ability to buy a standard product at low cost. Standardization, to the concrete products manufacturer, means the elimination of waste, ability to concentrate on a few sizes, lower cost of production and a smaller inventory. To the machinery manufacturer, it means concentration of effort, improved machinery, wider markets and a lower cost.

Mr. Wilk said that he had no quarrel to make with manufacturers who are now manufacturing an 18-in. unit to meet clay tile competition, but suggested the value of standardization where no such condition exists. He said that a 16-in. block fits in with architects' and builders' plans since it is a multiple of 4 in. and can be used without cutting, and that the public has been educated to its use and is rapidly accepting it. In other words, why undo the good already done?

#### Cinder Block Meeting

ROY McCANDLESS, president, invited free discussion of sales and service, advertising, taxes and selling problems in the meeting of the National Cinder Concrete Products Association, January 19. F. J. STRAUB, New Kensington, Penn., emphasized the need for neat, smooth blocks for ease in handling by masons, and recommended the use of facilities to keep blocks dry while in storage.

HERBERT DAVIS, Washington, D.C., strongly advocated service to the contractor and architect. HAROLD SPAIGHT, Cedar Rapids, Ia., elaborated on the business made available by working closely with the architect and told of the good prices obtained from making specialties such as arches, window facings, etc. L. G. RANDOLPH, Ann Arbor, Mich., told of an interesting job where cinder block were used as back-up on

the Burton Memorial Tower at the University of Michigan, where acoustic properties were of extreme importance.

HARRY LONGENECKER, Philadelphia, Penn., told of a special installation at the U.S. Navy Yard where his company developed a cinder block unit having unusual sound insulating properties for use in the airplane motor testing division. ALBERT BILL, Detroit builder, told of his concrete houses in Detroit. Mr. Bill has had unusual success in building low cost concrete houses, which have been stamped with the approval of the Federal Housing Administration. The demand for these homes has kept him busy. The concluding speaker was HERBERT VINCENT, Detroit, Mich., who gave an interesting talk on advertising methods which have brought results for his company. Among the unusual practices were the use of calendars and pictorial post cards.

The last session of the N.C.M.A., January 20, opened with a discussion of high early strength block, in which many took part, followed by a paper by M. W. FERGUSON who showed where the control of weight affected the profits.

#### Curing Blocks

W. G. KAISER, Portland Cement Association, gave an illustrated talk on the expansion and contraction of concrete in a paper, "The Need for Volume Control." This subject is of major importance since much wall cracking is known to take place when improperly cured masonry units are used.

Mr. Kaiser described tests made in the P.C.A. laboratory, showing conclusively that the moisture content of concrete masonry, when the wall is erected, is an important factor affecting the extent of shrinkage of the hardened concrete masonry wall. The tests showed that shrinkage can be appreciably reduced by using units in an air dry condition at the time they are laid. This, he said, appears to be the logical solution of the volume control problem.

J. MILLER SMITH, Detroit, Mich., told of the concrete curing process developed in Sweden, and more recently patented in the United States, where electricity is used as a means of accelerating the hardening. In this process, a low voltage alternating current is passed through the freshly made concrete. The wet mix serves as a resisting medium and heat is developed by relatively small electrical potential. The process is now a recognized branch of the building industry in Russia, said Mr. Smith.

The advantages to the cement block industry were summarized by the following points:

- (1) Re-use racks, pallets, kilns and molds every 8 hours.
- (2) Shipments may be made 24 hours after molding.
- (3) Dangerous shrinkage eliminated in 24 hours.
- (4) No hair cracks or warping.
- (5) Reduced storage and inventory.
- (6) High early strength.

- (7) Reduced breakage and rejections.
- (8) Low installation cost.
- (9) Economical operation.
- (10) Standardized uniformly cured units.

Mr. Smith concluded by describing just how the process would be applied in a typical plant.

Ways and means by which the manufacturer of concrete products can avail himself of the benefits of high pressure steam curing and the cost of necessary equipment were discussed by J. C. VOSBURGH, Chicago, Ill. As part of the discussion, CARL A. MENZEL, associate engineer, P.C.A., reviewed his laboratory tests and the advantages of such curing. Details can be had by reading Mr. Menzel's papers as published in the *Journal of the American Concrete Institute*, November-December, 1934, September-October, 1935 and May-June, 1936. Mr. Vosburgh described the equipment needed, with an estimate of the cost of the equipment and accessories needed for the entire operation. The meeting and convention closed, with a discussion by L. E. SCHWALBE, Wauwatosa, Wis., on proper yard curing.

#### Exhibits

In keeping with the demand for new and improved concrete products, the manufacturers displayed new developments in practically all equipment. Among the exhibitors were the following:

**BESSER MANUFACTURING CO.**, Alpena, Mich.—Displayed the fully automatic Besser "Plain Pallet" stripper with a daily capacity of 3000 units, a 12-cu. ft. mixer, the Straub oscillating attachment for Besser machines and the "Multi-Mold" machine. The latter is used for making odd-sized solid units, or small cored units, and is said to be adaptable for the manufacture of specialties and for making coal briquettes.

A contest was conducted in the booth and cash prizes were awarded for the three best and most complete lists of concrete units which can be made on one set of plain pallets on a Besser "Plain Pallet" stripper.

**MULTIPLEX CONCRETE MACHINERY CO.**, Elmore, Ohio.—Displayed a complete line of equipment including a new all steel automatic power tamper, a random ashlar machine, hand-operated equipment, a junior power press machine, a "Little David" brick machine and the recently acquired Edmonds cast-stone machine. Improvements featured in the automatic tamper are the hopper with attachment for assuring uniform feed while tamping and the Multiplex design, split-bar tampers. The feed hopper is suspended on a positive sliding rail so that the hopper will not wear the top of the mold boxes and will assure a uniform finished unit top.

**HAYDITE MANUFACTURERS' ASSOCIATION**, Kansas City, Mo.—Displayed different types of precast units made with haydite aggregate.

**COMMERCIAL SHEARING AND STAMPING CO.**, Youngstown, Ohio.—Displayed some of the commonly used stripper tile pallets and stripper block pallets, made to fit machinery in present use.

**INSULATED NATURAL STONE CO.**, Milwaukee, Wis.—Displayed a sample wall of lightweight concrete units with a 1-in. surfacing of Briar Hill sandstone, the molds in which the units are cast and illustrations of the splitting machine with which the stone is split into slabs.

**CONCRETE PIPE MACHINERY CO.**, Sioux City, Iowa.—Displayed samples of pipe, including the new "roller-head," a conduit pipe made with a special joint.

**BARRETT-CRAVENS CO.**, Chicago, Ill.—Displayed a line of lift trucks for econ-

omical handling of concrete products in plants.

**STEARNS MANUFACTURING CO.**, Adrian, Mich.—Had on display a large improved mixer and a power stripper machine.

**PORTLAND CEMENT ASSOCIATION**, Chicago, Ill.—Exhibited three model homes built of precast concrete units, with floor plans of the houses.

**F. J. STRAUB**, New Kensington, Penn.—Demonstrated the manufacture of concrete blocks by oscillation and samples of units so made taken from various plants.

**FRAZER PAINT CO.**, Detroit, Mich.—Showed samples of concrete masonry painted in various shades and colors.

**MEDUSA PRODUCTS CO.**, Cleveland, Ohio.—Displayed special waterproof and white cements and literature on all products of the company.

**SIKA, INC.**, New York, N.Y.—Showed a series of demonstrations of the waterproofing compound, "Sika," featuring waterproofing against great pressures.

**THE TECHNICAL DEVELOPMENT CORP.**, Detroit, Mich.—Had on display equipment for actual electric curing of concrete products, also featuring Chase racks especially designed to handle units to and from the curing chamber.

#### Permanent Glaze

Some interesting facts were learned about "Glaze-Raise Tools Finish Concrete," a new building product which is to be made available immediately in the United States and Canada. "Glaze Raise" is a process which is said to put a tool raised finish on the face of concrete, which assumes a high luster and to rival beautiful marble designs. The manufacture of these units is said to require only the ordinary machinery, and the unit is understood to withstand all destructive and temperature tests. THE GLAZE-RAISE CO. OF AMERICA is introducing the product.



Concrete Industries exhibit, Sherman Hotel, Chicago

## Concrete Pipe Manufacturers Talk Shop

**A**BOUT 100 members were in attendance at the 30th annual convention of the American Concrete Pipe Association, Chicago, January 21 and 22. Outstanding in the program were addresses on pipe designed by pre-stressing the reinforcing steel, concrete pipe and concrete culvert pipe promotion in some regions of the country, the financing of sewer improvements, and free and frank discussion of specifications and other problems pertinent to the industry. Officers elected were F. W. Paulin, Hamilton, Ont., Canada, president; H. F. Ahrens, Jr., Ampere, N. J.; W. F. Paddock, Seattle, Wash.; H. Eschenbrenner, Columbus, Ohio, vice-presidents.

### High Strength Pipe

F. R. McMillan, director of research, Portland Cement Association, told of Freyssinet's work on the design and manufacture of concrete pipe, as observed first-hand on a recent trip to Europe. Here, remarkable strengths have been attained by the combination of high frequency vibration during the pouring, compacting of the concrete under high pressure, high temperature curing and pre-stressing of the reinforcing steel. According to Mr. McMillan, Mr. Freyssinet's work is one of the greatest achievements in reinforced-concrete construction.

He described in detail, with the help of slides, the method of applying these principles on piling in a structure, for which the application is similar to pipe. On the job illustrated, 750 piles 100 ft. in length were completed in 4 days. The combination of principles listed above was applied, and the finished piles were capable of sustaining four times the load required of any pile to date.

Mr. McMillan described how vibration was applied externally during the pouring operation, and the jacking device used to introduce tension into the reinforcing bars. In this case, after vibration, a pressure of 225 p.s.i. was applied and maintained until the concrete had hardened. After steam curing for three hours, strengths of 4250 p.s.i. were obtained in the concrete. A complete cycle of operations was completed every 4½ hours. A 1: 1½: 1 2/3 mix was used on this job, using a slow-hardening portland cement to create a high resistance to sea water.

Mr. McMillan also told of the manufacture of pipe by the same principles, where 32-in. inside diameter pipe, with less than 2-in. wall thicknesses, were

designed to withstand 8 kg. per sq. cm. and withstood twice these pressures without failure. Here 10 sacks of cement were used per cubic yard of concrete, and the concrete produced had an ultimate compressive strength of 10,000 to 14,000 p.s.i. According to Mr. McMillan, by increasing the force of the vibration 10 times, almost no cement is required to attain a hard concrete. Where 5 gal. of water are used per 94 lb. sack of cement, after vibration and pressure have been applied, the water ratio drops to the low of 2½ gal. per sack of cement.

### Steam Curing

Carl A. Muenzel, research engineer, Portland Cement Association, told of his laboratory experiments in curing concrete units under high steam pressures, and the advantages of concrete so cured. The apparatus used is a cylinder built to withstand steam temperatures of 350 deg. F., with corresponding pressures of 120 p.s.i. According to his experiments, 350 deg. is the ideal temperature, with an hour required for each inch thickness of concrete to build up this temperature and cooling to take place at the rate of two hours for each inch of thickness.

About 24 hours is required to complete the cycle for 4-in. units, 30 hours for 8-in. units and 48 hours for 12-in. thicknesses. By keeping to these schedules, 28-day strengths are attainable in 1 or 2 days, according to Mr. Muenzel. Such concrete units are said to have less than half the shrinkage of concretes cured in the usual way and to offer exceptional resistance to alternate freezing and thawing and to the action of sulphate waters. In units so cured, where silica is not present in the aggregates, it has been found necessary to add finely ground silica for reaction with liberated lime, to attain maximum strengths.

In the Friday morning meeting, manufacturers told of problems in their respective localities and how the use of concrete pipe and culvert pipe was promoted. J. A. Dunn, Swampscott, Mass., told of the efficient designs and construction methods employed by the Massachusetts State Highway Department, which have placed this state in a leading position as a user of concrete pipe. Mr. Dunn said that upheavals under hard-surfaced roads each spring should be eliminated and that sub-drainage systems ought to be built under these roads—opening up a good field for the sale of concrete pipe.

G. D. Williamson, Yuba City, Calif., discussed problems involved in furnishing various types of concrete pipe for irrigation in the far west, and how present pipes so used are required to withstand pressures up to a 150-ft. head. In furnishing these pipe, the manufacturer generally is also the contractor, and maintenance is his problem. Shrinkage is a serious problem requiring adequate joints. Several types were suggested at the meeting, the general opinion being that rubber joints are the best type and that bituminous joints are unsatisfactory for this work.

M. W. Loving, secretary-treasurer of the Association, reported a membership increase in 1936 and said that 1936 returns would reveal the sale of a million tons of concrete pipe. It was unanimously voted that dues for 1937 be increased to permit advertising of concrete pipe to the colleges and universities in the form of bulletins and lectures. It was agreed that the future engineer should be familiarized with the uses of concrete pipe.

The meeting closed with extensive discussion of specifications. It was decided by vote that the tentative specifications designated by A.S.T.M. C76-35T for reinforced-concrete culvert pipe be adopted as standard.

### For Winter Operation

PORTSMOUTH MIXED CONCRETE INC., Portsmouth, Ohio, recently completed a modern plant with equipment for steam-heating sand and gravel for all-winter operation.

### Expands Office Space

NATIONAL GYPSUM CO., Buffalo, N. Y., is expanding its home office to occupy the entire first floor as well as the second floor of 190 Delaware Ave. The office force was increased by 60 persons in 1936.

### Plant Addition

UNITED STATES GYPSUM CO., Chicago, Ill., has let a contract for a one-story addition to its Los Angeles, Calif., plant and warehouse, 8430 Quartz Ave., to cost about \$175,000.

### Concrete Pavement Yardage

AWARDS of concrete pavement for December, 1936, were announced by the Portland Cement Association as follows:

Type of Construction	Sq. yd. awarded during December	Total sq. yd. for the year 1936
Roads	4,025,878	40,633,335
Streets	1,405,239	15,971,676
Alleys	36,957	381,460
	5,468,074	56,988,471

# Merchandising Concrete Products—Part 3

• "AGGRESSIVE SELLING", By Harold O. Hayes

WITH A QUALITY PRODUCT, a full knowledge of the product, and a sales kit, the salesman is completely equipped to sell aggressively.

Assuming you are just starting after the "above ground" market, the first problem is to get a good mason contractor interested in your plan. For your selling effort is entirely wasted if you interest a prospect, then can't get a fair bid on the work. So, first of all, get at least one good mason contractor to coöperate with you.

It will be to his interest, for you are going to create business for him. When you win his interest, get him to lay up a few sample wall sections at the plant, or in some other suitable place for a display.

Care should be taken to get the best of workmanship in the finished panels. This may mean relaying some panels two or three times to get the most effective results. In this way the mechanics become proficient at "above ground concrete masonry" construction.

These panels should be located where they will serve as a permanent exhibit, to supplement miniature models or portable panels. Various patterns and types of wall construction should be included in this exhibit to demonstrate the flexibility of the material.

Now you are ready to solicit for direct sales. Every prospect should be called on, and as early as possible after you learn of the plan to build.

It is much better to approach prospects about specific jobs than merely about the general subject of concrete masonry, concrete floors or other products. By that, I mean, solicitations should be based on use for a specific job. Set as your objective the sale of your products for a job which is definitely under way. This is particularly true with architects and operative builders.

Other prospects may be located through construction reports such as Dodge, through real estate transactions reported in the daily papers, through building permits issued from local building papers and from reports of fires. It is possible to develop an early and friendly contact by carefully watching these various prospective builders. And there is no better way to win the coöperation of desirable architects than by bringing them clients, which you may be successful in developing through diligent solicitation of all avenues of business.

Various developments in making sales will create occasions for you to contact financing organizations, realtors and others who are indirectly interested in the use of your material. With each contact, occasion should be taken to point out desirable features of your products which should be of particular interest to these several individuals.

The financing organization should be interested in the long life, low upkeep and low insurance rates. The realtor wants to know sales features which your products add to the completed house. The lumber dealer, if you distribute through him, will be interested in the profits to him, and in the accessory materials with which he can add to his volume.

Occasionally old building codes may not include provision for newer construction methods. And when this interferes with sales, steps are necessary to end such discrimination. This can be done by showing the comprehensive tests on concrete masonry, as summarized in "Facts About Concrete Masonry," and referring to the original test reports. The approval by more than 40 substantial cities, by the federal government, and by other organizations, listed on page 44 of the same book, will also be of interest to officials responsible for local building regulations.

A time saving, yet efficient, plan of

operation is to call every new prospect for an appointment to discuss his plans for building. Where possible it is advisable to make a personal call on every prospect, even though plans to build are indefinite. That gives you an early opportunity to tell your story, and it will enable you to judge the desirability and intensity of follow-up calls.

No set rules can be given for architectural contact. But a logical plan is to coöperate with those who are open to coöperation, and to go direct to the owner in other cases.

The new edition of "Facts About Concrete Masonry" has new test reports which provide a new story to give those architects upon whom you have been calling regularly—namely, Section 10, Heat Transmission of Concrete Masonry Walls, and Section 11, Sound Absorbing Value of Concrete Masonry. In addition the whole subject of concrete masonry is presented in a new dress, so from the new text data it is easy to move on to discussion of other qualities of concrete masonry, and the several interesting uses of it.

On the other hand, in discussion with new prospects the quickest way to win interest is with the photographs of completed houses. After interest has thus been aroused in the result, the prospect will become interested in learning about the qualities of the product, as presented in "Facts About Concrete Masonry." Portable models or samples maintain interest, making it easy for the prospective builder to understand just what the construction you propose consists of. A trip to the office or factory exhibit may provide a good step for a follow-up. And a personal visit to a completed job of the type of construction being promoted may be necessary before completing the sale. If the first sale in the community of a new type of construction is involved, the expense of a trip to the nearest neighboring job may be necessary and fully justified.

Now—a few ideas to keep in mind in making the sale:

Don't try to force a sale, but keep pressing forward for a favorable decision.

The less said about a competitor the better. "Talk up" your own product. There is no better way to arouse curiosity.

\* Published by the Portland Cement Association, 33 West Grand Ave., Chicago, Ill., and readily obtainable by any bona fide concrete products manufacturer.



A sample wall section, with good workmanship in the finished panels, is a merchandising aid

osity about a competitive product than to keep talking about it.

Always take the attitude that the prospect is going to use your material; that it is the best for him and that you know he will realize it and want it when you have made all of its qualities known to him.

Do not show evidence of eagerness to make the sale. This may arouse suspicion. But, through suggestions as to good masons, the type of mortar joint which is most pleasing or most satisfactory, the preferred type of exterior flin-

ish and other alternatives the owner may have in using your material, you can diplomatically build your sales story to the point of selecting the type and quantity of units desired.

Where a decision is withheld, the sale may be forced sometimes by citing the importance of thoroughly cured units, and the necessity of sufficient time to adjust production schedules to supply demand. As building volume increases the importance of this will become greater and builders who want to avoid delay in their construction will appre-

ciate the desirability of placing material orders early.

There are many excuses for delaying the placing of an order for concrete products, as all manufacturers are well aware. And the longer a contract is "pending" the greater is the possibility of losing the sale.

Therefore, it behoves every salesman to present his products as fully and convincingly as possible, and to press continuously for an early favorable decision. That is aggressive selling and the road to success.

## Expanding

MILLER CONCRETE PIPE CO., Valdosta, Ga., is erecting a second plant at Eden, Ga.

## Buys Competitor

WHITE CONCRETE PRODUCTS CO., Elkhart, Ind., Leroy White, owner, has purchased the Jordan Cement Block Co. plant adjoining, and will combine and expand the two operations.

## To Make Pipe

SOUTHEASTERN SAND AND GRAVEL CO., Milstead, Ala., is building a plant to manufacture concrete pipe from 12 to 60 in. in diameter, using a Quinn Wire and Iron Co. machine.

## New Plant

SANTA CLARA CEMENT PIPE CO., Solestad, Calif., is building a plant near town.

## Changes Ownership

GRANITE CONCRETE BLOCK AND COAL CO., Elyria, Ohio, was recently purchased and incorporated by A. M. Pitts, Edwin Polvoorde, Floyd Edington, and Louis W. Beaumont, who is manager.

## Use Only Tested Blocks

UTICA, N. Y., has put into effect a building code covering strength requirements for concrete block. The blocks made by five local manufacturers were tested and accepted. These manufacturers are Joseph Bocchino, Bart J. Ruddy, E. S. Campion, American Hardwall Plaster Co. and Empire Wall Plaster Co.

The code requires concrete blocks must carry an average compressive strength of 1,400 p.s.i. of gross area and no individual block may carry less than 1,000 p.s.i. These blocks must be at least 28 days old before delivery on site of construction and have not exceeding 10% water absorption by weight. Blocks tested show the Utica average to be 1,440 p.s.i. with 5.6% water absorption.

## Changes Ownership

BLOCK AND BRICK, INC., Detroit, Mich., has purchased the FLINT SAND-STONE BRICK CO., sand-lime brick plant, Flint, Mich., which was idle for several years. It is now known as the GENESEE COUNTY BRICK CO. Sand-lime block are made in a Besser concrete-block machine. F. Landon Hubbard is president and general manager of Block and Brick, Inc.

## Distribution Kink

HUDSON CONCRETE BLOCK CO., INC., Croton on Hudson, N. Y., has been able to distribute its product over a wide area to the north by use of trucks previously returning empty to the slate quarries near Rutland, Vt. The slate companies are trucking much of their product to New York City, and the trucks returning empty pick up loads of concrete products for orders as far as 100 miles from the plant.

## New Firm

CONCRETE PRODUCTS CORP., Humboldt, Iowa, is the name of a new firm organized to supersede the activities of the former branch plant of the Wilson Concrete Co., with a capital stock of \$25,000. P. C. Pierson is president; E. L. Arthur, vice-president; and C. F. Wilson, secretary-treasurer.

## Cement-Asbestos Products

KENILWORTH MANUFACTURING CO., Kenilworth, N. J., manufacturer of asbestos products, recently purchased the Sims Machinery Corp. plant. The property is to be converted into a cement-asbestos shingle and products factory. J. A. Scharwath, president, said that new buildings, equipment, machinery, and a new railroad siding would cost about \$500,000.

## Fleet Increased

EDWARD BALF CO., Hartford, Conn., recently increased its fleet of ready-mixed concrete delivery equipment by the addition of three 3-yd. Rex mixers.

## Adds Equipment

BEE RIDGE CONCRETE PRODUCTS CO., Sarasota, Fla., recently installed modern equipment, including 35 steel cars to facilitate handling, two curing rooms, each to hold 1000 blocks and floor joist gang molds with a vibrating table. The curing rooms are equipped with Amco atomizer sprayers to produce a fog at 180 deg. F. under 50 lb. pressure. It is said that a 24-hour cure in these rooms will increase the strength of the block to a maximum and decrease the subsequent water absorption to a minimum.

## Reorganization

CEMENT PRODUCTS, INC., Davenport, Iowa, has completed plans for reorganization under 77-B of the national bankruptcy act. The new company will be known as AUSTIN CRABBS, INC., and will conduct a concrete products business. It will have an authorized capital stock of 100 shares of no par value.

## Another Fire

CONCRETE BLOCK PLANT of J. J. Anthony, Indiana, Penn., was recently destroyed by fire at a loss of \$5,500.

## Concrete Homes at \$2,065 Each

NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO., recently constructed 41 houses of four and five rooms to sell at \$2065, including the land, at Swantown, Newport News, Va. The houses were built for men engaged in the plant and have been planned with the view of producing a house which could be purchased in 20 years at a rate of about \$20 a month. By so doing, the company has entered a field which housing experts heretofore believed could not be developed by private capital. Chief features of the construction are cinder-concrete blocks for first-story walls and precast concrete joists supporting concrete walls.

## Proposed Freight Changes on Concrete Block

M-3606. Blocks, building (non-ornamental), made of cinder and cement; sand and cement; slag and cement; slag, sand and cement or cinder, slag and cement, C. L., from Frankford Stations (Philadelphia), Penn., to Waterloo, Va., \$2.40 per net ton.

49374. To cancel commodity rates in W. D. A. 49374 on building blocks (cement or concrete, not reinforced with metal, not ornamental or decorative), and curbing (cement or concrete, not reinforced with metal), minimum weight 50,000 lb., or, if less, See Note 1, from points in Indiana, Michigan, Ohio, New York, Pennsylvania and West Virginia, to points in Illinois, Indiana, Michigan, Pennsylvania, New York and West Virginia.

### SPRAY CONCRETE

BLOCKS—VAULTS—WALLS  
Ornamental Casts, etc.  
with ADJUSTABLE CEMENT SPRAY  
\$15.00 and \$17.00

Eureka Art Stone Works  
Box 602, Eureka, Calif.

### CEMENT COLORS

#### CEMENT COLORS

*Will not fade—extra fine and strong*  
TAMMS SILICA COMPANY  
228 North La Salle St. Chicago, Illinois

10221. To establish class 12 rating on cement or concrete building blocks, minimum weight 60,000 lb., or, if car is smaller, (See Note 1), between territories covered by S. W. L. Tariffs 61-B, J. R. Peel's I. C. C. 2866; 151-B, J. R. Peel's I. C. C. 2719; 152-D, J. R. Peel's I. C. C. 2794; 153-A, J. R. Peel's I. C. C. 2606; 154-C, J. R. Peel's I. C. C. 2474, and 173-H, J. R. Peel's I. C. C. 2808.

M-3596. Blocks, non-ornamental, made of cinder, cement, sand and slag, C. L., minimum weight 60,000 lb., from Easton, Easton (Bushkill station) and Easton (13th St.), Penn., to Williamsport, Penn., \$2.55 per net ton.

## Ask RFC Loan to Make Lime

LUTHER KELLER CO., Portland, Penn., whose lime plant has been out of production for three years since the death of Luther Keller, has applied, through Russell Keller, son of the former owner, for a \$100,000 loan from the Reconstruction Finance Corporation to rehabilitate and reopen its plant.

### CEMENT COLORS

#### STAR and ANCHOR COLORS

Geo. S. Mepham Corp., East St. Louis, Ill.  
C. K. Williams and Co., Easton, Penn.

## Consolidation

RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill., assets and business were acquired by the COMBUSTION ENGINEERING CO., INC., and the operation of the business will be continued as Raymond Pulverizer Division, Combustion Engineering Co., Inc., Chicago, Ill.

## Planning Improvements

KELLEY ISLAND LIME & TRANSPORT CO., Cleveland, Ohio, is reported to be planning a new crushing plant at its quarry on Kelley Island, near Sandusky, Ohio, to cost about \$100,000.

### MOLDS

Molds for every purpose. Send for Catalogue.

ARTISAN MOLD WORKS  
ELKHART, IND.

### SPECIAL AGGREGATES

#### SPARKLING MARBLE SPARKLING GRANITE

All colors—all sizes  
TAMMS SILICA COMPANY  
228 North La Salle Street  
Chicago, Illinois

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We wish to thank our many friends among the concrete products producers who through experience recognize unusual merit where merit exists and honored us by their inspection and approval of the MULTIPLEX equipment exhibited at the Chicago Concrete Exposition.

What a great show it was—what enthusiasm—and what a rosy future to look forward to.

MULTIPLEX offers 16 models to choose from in hand or power, for blocks, tile, flue blocks, or backup units.

Write for our literature.

**THE MULTIPLEX CONCRETE MACHINERY CO.**  
ELMORE, OHIO

**THE BEST BLOCKS**  
are made on  
**"COMMERCIAL"**  
Presteel Pallets

Quicker and Uniform Drying  
Light in Weight — Easy to Handle  
Will Not Break

**LOWER IN PRICE THAN PLAIN PALLETS**

and Require Less Drying Space  
Original Machinery Cost is Lower  
on Machines Using Cored Pallets

Cost of attachments for different widths or lengths of units is enough less than corresponding attachments on plain pallet machines, in many cases, to pay for the additional pallets required.

*We make all sizes and  
styles of Pallets—let us  
quote your requirements.*

**THE COMMERCIAL SHEARING  
AND STAMPING COMPANY**  
YOUNGSTOWN OHIO

**LOW INITIAL COST**  
**LOW MAINTENANCE COST**



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E A S Y  
TERMS

Save money on your production costs by installing Chase Lift Truck Rack or Concrete Cars with Chase Patented Spring bearings—dust proof, oil retaining flexible boxings with roller bearings. Used and recommended in most of the concrete plants.

WRITE  
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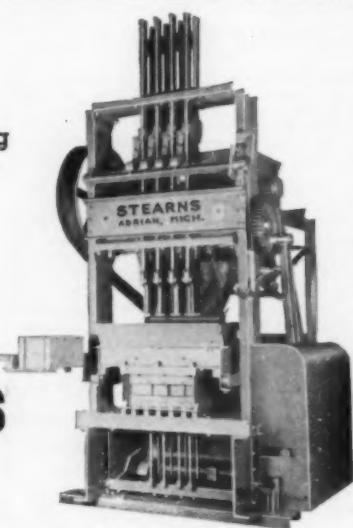
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CHASE FOUNDRY & MFG. CO.  
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You're thinking  
of making  
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look into  
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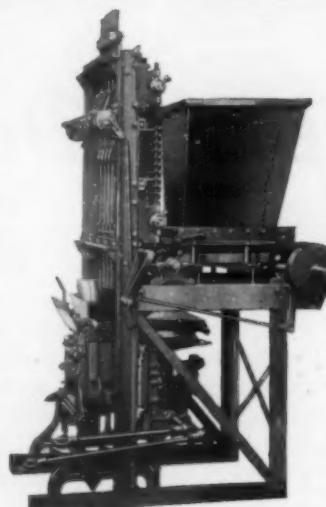
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Power  
Stripper



— its cost (including pallets and all necessary attachments) is less than that of any similar equipment of equal capacity per man. Ask for circulars.

**STEARNS MANUFACTURING COMPANY, Adrian, Mich.**  
Eugene F. Olsen, General Manager

*Miles*  
CONCRETE EQUIPMENT



The  
1937  
Models  
are ready

*Are You Ready  
for the BIG  
year that is  
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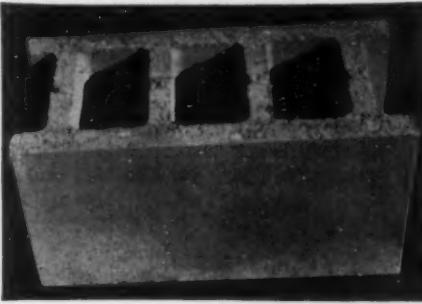
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## THE MOST HIGHLY PERFECTED CONCRETE UNITS EVER MADE

The New Units with fully pressed top made on Besser Plain Pallet Strippers are several steps ahead of anything in concrete masonry that has ever been made before. The faces, edges and corners are as true and smooth as cut stone. They have found a market in the higher class construction field in many places where concrete masonry has never been used before. These units are making new and bigger sales and they offer great possibilities to the concrete products industry.

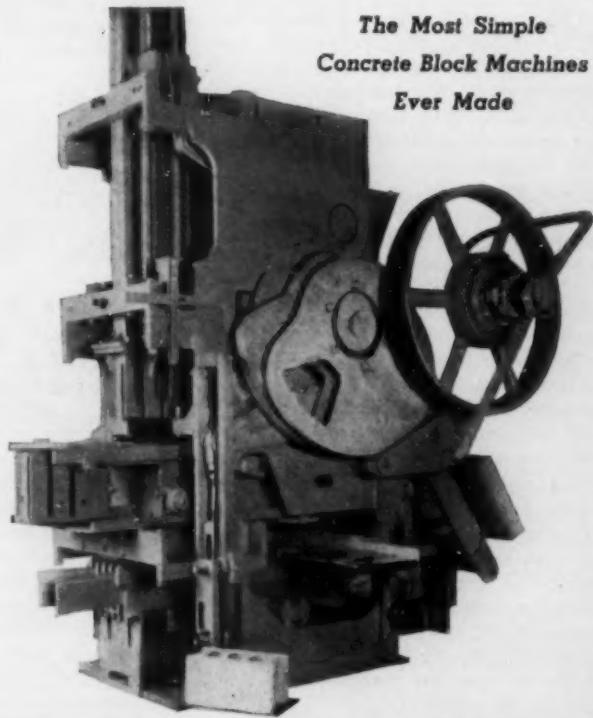


ALL SIZES ARE MADE ON  
ONE SET OF PLAIN PALLETS



The exclusive Besser principle of making all units on a single set of plain pallets has made the units with fully pressed top possible. No other method has yet been devised to make blocks of such high quality. The new Besser Strippers have been further simplified and they now offer still greater economies in first cost and in operation.

The Most Simple  
Concrete Block Machines  
Ever Made



### BESSER PLAIN PALLET STRIPPERS

FULLY AUTOMATIC—3 Models—Capacities: 2000 to 4000 units per day.  
SEMI-AUTOMATIC—4 Models—Capacities: 1000 to 2000 units per day.  
POWER OPERATED with

Hand Controls—2 Models—Capacities: 500 to 1000 units per day.  
MULTI-MOLD

Hand Operated—Capacity: up to 300 units per day. For manhole blocks, slab and small cored units.

AUTOMATIC BRICK MACHINES—Capacities from 10,000 to 30,000 units per day. For brick, slabs, coal cubes and other small units.

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Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL,  
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CONCRETE PRODUCTS DIVISION Besser Plain Pallet Stripper

## Urged to Change R.P. Law

CHAMBER OF COMMERCE OF THE UNITED STATES, through a special committee, urged Congress on January 9 to take action to make easier the path of business under the Robinson-Patman act on price discrimination pending clarification of the law. The committee, which was headed by John A. Law, Spartanburg, S. C., recommended that Congress prevent the possibility of suits for threefold damages against business men "however earnestly they seek to comply with the new law, which is avowedly ambiguous and uncertain in its application," until the Federal Trade Commission had completed a series of exploratory cases and judicial review had made definite the applications of the act.

The committee also recommended postponement of further Federal and State legislation extending the general purposes of the law, saying:

"The attempt to determine and outlaw price differences which are unfair is at once too important and too difficult to be essayed, because of complications of additional State or Federal legislation before the constitutionality of the various phases of the present law has been ascertained, and before the law's provisions have been clarified and successfully applied."

The committee stressed that it was making constructive criticism "solely intended to point out means for a practical basis of approach to the difficult problems which are involved."

The report called attention to the practical difficulties confronting commerce and industry in trying to comply with the provisions of the act. It stated that business men found it difficult to adjust practices to the requirements of act, not only because of the variety of interpretation, which might be placed upon its meaning but also because it projected and required methods of selling and buying which were in decided contrast with those which had been generally followed in the past.

"The basic theory of the act," the report set forth, "is that all competing customers be given equal treatment. It allows for differences in price only to the extent that probable savings can be effected by the seller by reason of the cost of manufacture, sale or delivery resulting from differing methods or quantities in which such commodities are to such purchasers sold or delivered.

"This is a wholly different theory of price-making than that which has been followed in the past. The seller has been governed in the prices he quoted to no inconsiderable extent by the value

he has placed upon getting the business of some particular buyer. He has considered not only the desirability of the account but the credit position of the buyer, his importance as an outlet, the competitive situation, the volume needs of the seller at the time the business was sought, the length of time the buyer has been a customer, the loyalty of the customer, the aggressiveness with which he merchandises, his equipment for selling, the influence which having one buyer as customer would have upon others whose business is desired, and even more intangible considerations than these.

Considering the fact that there are in the United States more than 1,600,000 retail establishments, as well as many thousand local manufacturers, processors and wholesale distributors, whose status may be completely changed through applying the Robinson-Patman principle to all intrastate transactions, some of the difficulties which will be faced are immediately apparent."

Blaine S. Smith, president, Universal Atlas Cement Co., was a member of the special committee which drafted the report.

## Appointments

PENNSYLVANIA - DIXIE CEMENT CORP., New York City, through Walter S. Wing, vice-president, announces the appointment of J. R. Fairman as assistant to the vice-president, effective January 15, 1937. Mr. Fairman graduated from the University of Missouri in 1909 with a degree of Bachelor of Science in Civil Engineering. In the early period of his business career he engaged in construction activities in connection with railroads, concentrating on design and construction. His activities in this field were interrupted for his service in the World War during which he was cited in General Orders for exceptional, meritorious and conspicuous service and on his return was commissioned as major in the regular army from which he resigned late in 1919. Since 1920 Mr. Fairman has been associated with the Portland Cement Association, starting as a fieldman in Kansas City, then district engineer in Birmingham, Alabama, then regional manager at Atlanta and during recent years regional manager in charge of the eastern offices of the Association at New York.

## Wage Increases

DEWEY PORTLAND CEMENT CO., Kansas City, Mo., increased wages at its two plants, effective January 1, ranging from 6 to 15%.

## To Make River Shipments

DEWEY PORTLAND CEMENT CO., Davenport, Ia., plant will operate its own barge line on the upper Mississippi river next season, it is announced by D. M. Tyler, vice-president, with offices in Davenport. Twelve steel barges, each having a capacity of 2,000 tons, are under construction at St. Louis. Six of the fleet have been completed. They will be comparable in size to large barges towed by the Federal barge line. The barges will be towed by the chartered towboat "Transporter" of the Fall City Towing Co., Louisville, Ky. Coal and cement will be the principal freight. The Dewey company, it is reported, uses 110,000 tons of coal annually at its Davenport plant. Using four barges to a tow, coal from the southern Illinois field will be brought up the river and cement and other merchandise loaded for downstream travel.

## Profit Sharing

NORTHWESTERN STATES PORTLAND CEMENT CO., Mason City, Ia., inaugurated a profit-sharing compensation plan for employees in 1936. Reports at the recent annual meeting showed the company had shipped 45% more cement the past year than in 1935. This increase in demand made possible a 20% step-up in operations. The company is operating at full capacity and is hoping to continue this rate through the winter months. The company operated continuously the past year except for the necessary shutdown for repairs in the spring. The plant in 1936 had the largest average payroll of any time since 1930.

## Extends Phosphate Lease

GENERAL PHOSPHATE CO., Boston, Mass., recently received an extension of its lease on extensive areas along the Beaufort county coast in South Carolina for a period of six months. The corporation's initial investment in dredging machinery will be about \$750,000.

## Buys Property

STANDARD SLAG CO., Youngstown, Ohio, recently purchased 250 acres of property in West Middlesex adjoining Shenango township, Penn.

## Fire Losses

HYDEVILLE SLATE CO., suffered \$25,000 damages to its finishing plant near Granville, N. Y., in a recent fire.

FIREVIEW SLATE CO., recently suffered \$13,000 fire damages at its Slatington, Penn., plant.

# THE INDUSTRY

## New Incorporations

**Portland Gravel Co.**, Portland, Ore., has reduced its capital stock from \$140,000 to \$30,000.

**Fordyce Gravel Co.**, Pharr, Texas, has increased capital stock from \$20,000 to \$40,000.

**Mount Hebron Sand Co.**, Klamath Falls, Ore. Filed by Wilson S. Wiley, attorney, Klamath Falls.

**Lehigh Lime Co.**, Mitchell, Ind., has decreased authorized capital stock to 2000 shares of \$50 par value.

**Argyle Cement Block Co., Inc.**, North Arlington, N. J.; 100 shares, no par value. Agent, Thomas Tamburello.

**New Jersey Gravel and Sand Co.**, Farmingdale, N. J.; 200 shares no par value. Agent, Martha W. Chadwick.

**Western Indiana Gravel Co.**, Lafayette, Ind., has been reorganized. Its capital stock is now 6300 shares, no par value.

**Yosemite Portland Cement Corp.**, San Francisco, Calif., has increased its capital stock from \$4,000,000 to \$5,055,310.

**Silica Products Co.**, Klamath Falls, Ore.; capital stock, \$5000. Incorporators are U. S. Balentine, L. K. Porter, A. W. Porter and Fred Jordan.

**Wilton Molding Sand Corp.**, Manhattan, N. Y.; to deal in molding sand, gravel; \$5000; Weiss & Berlowitz, 63 Park Row, New York City.

**Gotham Sand and Stone Corp.**, New York, N. Y.; building materials; 100 shares no par value; Cornelius P. Cotter, 551 Fifth Ave., New York City.

**Harlem Contracting Co., Inc.**, Manhattan, N. Y., consolidation of Harlem Contracting Co. and Atlantic Asphalt Block Co., Inc.; \$50,000; Wood, Molloy & France, 25 Broad St., New York, N. Y.

**Belmont Quarries, Inc.**, Leesburg, Va.; to quarry, manufacture and sell stone; maximum capital, \$40,000. Incorporators are C. M. Lawrence, Herndon, Va., and H. I. Tiffany, Leesburg, Va.

**Bransfield Cinder Co., Inc.**, 6601 S. Mozart St., Chicago, Ill.; to deal in cinders and building materials; 2000 shares p.v. common. Incorporators are Clara A. Bransfield, Estelle C. Lange and M. Andrews.

**National Gypsum Co.**, a Delaware corporation authorized to do business in Virginia, has increased its maximum authorized capital from \$8,035,000 to \$8,675,000. (See Rock Products, November, 1936, p. 73.)

**Washington Concrete Co.**, Washington, Iowa; concrete products; authorized capital \$25,000 divided into 250 shares of \$100 each. Incorporators are R. E. Arthur, E. L. Arthur, C. F. Wilson, Mrs. C. F. Wilson and D. C. Pierson.

**Farmington Gravel Co.**, Des Moines, Iowa; to deal in sand, gravel and crushed stone; capital \$50,000 divided into 500 shares of \$100 each. Incorporators are Grover C. Hubbell, H. E. Millen, Sam Abramson and Sam Ruemper.

**Austin Crabs, Inc.**, Davenport, Iowa; to deal in cement and concrete products, sand, gravel, cement and masonry materials of all sorts; authorized capital stock, 100 shares, no par value. Incorporators are Austin Crabs, J. Y. Bone and Gus Stofer.

**Spring Grove Sand and Gravel Co.**, Burlington, Iowa; to deal in gravel, sand, earth, stone, minerals and other materials; authorized capital stock, \$25,000, divided into 250 shares of \$100 each. Incorporators are A. Dahlquist, F. O. Block, R. B. Swift and D. S. Block.



The late Ben Stone

## Personals

**Ken K. Kutz**, formerly sales manager of the Metropolitan Concrete Co., Cleveland, Ohio, has joined the sales force of the Standard Portland Cement Co., with headquarters at Cleveland.

**P. N. Bushnell**, safety engineer for the Portland Cement Association, Chicago, Ill., gave a talk before a Chamber of Commerce industrial safety conference at Duluth, Minn., January 6.

**Robert B. Henderson**, president, Pacific Portland Cement Co., San Francisco, Calif., was elected a regional vice-president of the National Association of Manufacturers at a recent meeting in New York of the N.A.M. board of directors.

**R. L. Taylor**, Wheeling, W. Va., who is associated with the Diamond Portland Cement Co., gave a talk on the history and manufacture of portland cement before the Kiwanis club of Coshocton, Ohio, December 29.

**R. M. Hardgrove**, originator of the grindability test known as the "Hardgrove Method," and engineer in the service of The Babcock & Wilcox Co., New York, N. Y., was a speaker at the recent Seventeenth Fuel Engineers' meeting sponsored by Appalachian Coal Co., Cincinnati, Ohio.

**William J. Reardon**, owner of the Reardon Cement Co. of Cincinnati and Chicago, recently returned from a trip south to enlist the support of Louisiana and Mississippi for the Barkley-Vinson Stream Purification Bill to be introduced into the present Congress.

## Obituaries

**William P. Bowman**, manager of the New York branch of John A. Roebling's Sons Co., died January 22.

**Frank A. Roosa**, inventor of a concrete pipe making machine, died January 14 at Waterloo, Iowa.

**Oliver L. Shumard**, former superintendent of Medusa Portland Cement Co. plant at Silica, Ohio, died at his home in Dixon, Kan., January 10 after a ten days' illness.

**Oll Green**, 56, superintendent of the Basic Products Co. stone quarry near Peebles, Ohio, died of a self-inflicted shotgun wound January 14.

**John Henry Bredenberg**, 78, died at his home in Augusta, Ga., December 30. He was a prominent citizen of Augusta and was proprietor of Bredenberg & Co., manufacturer of cement vaults.

**John C. Dodds**, 62, president, since 1911, of George Dodds & Son Granite Co., Xenia, Ohio, died in Pittsfield, Mass., January 17 following an operation. He was also president of a subsidiary, the Dodds Granite Corp.

**J. F. Max Patitz**, chief consulting engineer, Allis-Chalmers Manufacturing Co., Milwaukee, Wis., died suddenly of a heart attack January 3. He had been associated with Allis-Chalmers for more than fifty-one years.

**Judge James H. Swango**, 66, Terre Haute, Ind., died suddenly January 14 of heart attack. Prominent as a lawyer, he was a former commissioner of probate court at Terre Haute and president and treasurer of the Wabash Sand and Gravel Co., which he helped organize in 1905.

**Clarence S. Whittier**, 80, well known granite quarry owner of Montpelier, Vt., died January 13. He owned and managed the Adamant Quarry Co. for about 25 years until he sold his interests a few years ago to the Hughes Granite Co. and retired from active business.

**Ben Stone**, 57, owner of the Stone Sand and Gravel Co., Indianapolis, Ind., and a former secretary of the Illinois Sand and Gravel Association, died December 24. Coming to Indianapolis in 1920, he was engaged in the sand and gravel business since. He was manager of the Meron Gravel Co. until last summer, when he established his own business.

**Herbert D. Raff**, 65, president and general manager of Diamond Portland Cement Co., Middlebranch, Ohio, and a nationally known leader in the cement industry, died December 23 in Canton, Ohio, of a heart attack, following an operation the previous day. A native of Canton, Ohio, he went to Dallas, Texas, as a young man where he designed and constructed a cement plant and remained to operate it as general superintendent. Upon his return to Ohio, he operated a cement plant at Ironton for three years, returning to Canton in 1907 as superintendent of the Diamond organization. In 1927 he was made general manager and vice-president, and later he was elected president.

**William Hunter Andrews**, late chemist prominently known in the cement industry, was asked for at recent industry conventions by many friends who had not heard of his death June 7, 1936. "Bill" Andrews, born in 1878, started in the cement industry after leaving Ohio State University. Working first as chief chemist for Castalia Portland Cement Co., Castalia, Ohio, he changed, in 1902, to The Alta Portland Cement Co., Rushsylvania, Ohio. Seven years later he joined Three Forks Portland Cement Co., Trident, Mont., as supervising chemist, and in 1925 he became affiliated with Allentown Portland Cement Co., Catawissa, Penn., as supervising chemist of the Evansville and Valley Forge plants.

## Crushed Stone

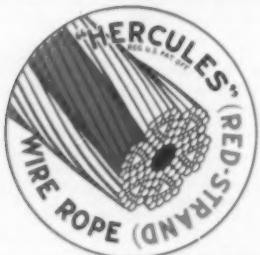
**Atlanta, Ga.**: The city rock quarry resumed operation January 1.

**Beloit, Kan.**: Lulu township has bought the county's rock crusher and is planning a WPA road project.

**Jasper, Ala.**: Walker county recently secured a 6-ton crusher and is producing material for surfacing Gibson Highway.

**Jefferson, Wis.**: Jefferson County Agricultural Committee is operating a limestone crusher in the Town of Koshkonong pit.

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HOPKINTON, Iowa: Delaware county is starting a WPA stone crushing project to produce material for two roads.

PRINCETON, Mo.: WPA agricultural limestone crushing projects were closed down in Mercer county early in January.

WEST PLAINS, Mo.: Elk creek community is planning to start a limestone crushing project. Limestone ledges are being prospected.

GRAND RIVER, Iowa: The quarry on the Oscar Shields farm, which constituted a soil conservation project, has been shut down.

BOWLING GREEN, Ky.: A new rock crusher was recently installed at Boiling Springs and crushed stone for roads is being produced.

MEMPHIS, Mo.: A rock crusher has been secured for the quarry on the John W. Boley farm and WPA labor is producing limestone.

INDEPENDENCE, Iowa: Buchanan county has purchased a \$5075 rock crusher and expects to make rapid progress on WPA county road surfacing projects.

HASTINGS, Minn.: Farmers in the vicinity are planning to start a crushing project for production of agricultural limestone with the aid of WPA labor.

WHEELING, W. Va.: A WPA quarrying project was started the middle of January at the Bowman quarry to produce material for street projects.

WINTERSET, Iowa: Madison county has purchased from Herman Grulke, a new quarry northeast of town, just east of the Casper quarry. It will not be worked at present, but will be saved for the future.

R. W. PHILLIPS, Hampton, Iowa, recently installed machinery in the rock quarry on the Ray Lamb farm north of Marble Rock, Iowa, and began production of agricultural limestone.

BLOOMDALE, Ohio: The Bloom township stone quarry opened early in January for a run of three or four months. The project is under WPA and will supply material for roads.

DARLINGTON, Wis.: Lafayette county has started crushing of agricultural limestone. The Tollakson quarry is in operation and one near Blanchardville may be opened soon. The Crouse quarry at South Wayne will be operated again this year.

ADAIR, Iowa: A rock crusher has been secured for the new quarry on the Fred Owen farm in Jackson township east of Dale, and crushed limestone for farms is being produced. Adair county is operating a quarry at Howe for road material.

BONAPARTE, Iowa: The WPA stone crushing project at Bonaparte has been completed, and the men who were employed on it have been transferred to a quarry at Mud creek, west of town, to produce stone for a building project at Farmington state park.

KIRKSVILLE, Mo.: Adair County Soil Conservation Association is operating a crusher at the Laughlin quarry. Another quarry is to be opened soon about three miles south of Novinger. WPA is operating a quarry on the Andy Scriven farm for road material.

QUARTZITE STONE CO., Lincoln, Kan., is filling a new 1000-ton order for crushed rock as well as a 15,000-ton order for filter rock for the Hutchinson sewage disposal plant and two rock contracts. Supt. J. R. Carlgren reports that business seems to be picking up.

Mt. PLEASANT, Iowa: A WPA project for production of agricultural limestone was started on the John Peterson farm near Oakland Mills early in January but was discontinued a week later. Original indications had been that the project would continue for at least six weeks.

## Sand and Gravel

UNITED SAND AND GRAVEL CO., Morrisville, Penn., is being sued by the borough of Morrisville on charges of violating an ordinance requiring obtaining of a permit before building is done.

FLOYD KERNS' farm, between Waterloo and Cedar Falls, Iowa, will, it has been reported, be the site of a busy gravel pit in the spring. About 80 ft. of gravel under a small overburden has been located on the farm, and a big demand for road gravel is pending.

## Cement

LAWRENCE PORTLAND CEMENT CO., Northampton, Penn., has leased a large suite of offices on the 8th floor at 10 High St., Boston, Mass.

## Manufacturers

THE MERIAM CO., Cleveland, Ohio, has completed an extension to its gas and oil engine rebuilding plant.



John C. Hopkins

AUDUBON WIRE CLOTH CORP., Philadelphia, Penn., recently appointed R. L. Register to handle sales in the Pittsburgh district.



J. A. Krugler

FOSTER WHEELER CORP., New York, N. Y., announces appointment of W. L. Martwick as general sales manager.

PANGBORN CORP., Hagerstown, Md., gave employees on hourly and piece work rate an increase of 10% on December 30.

TRACTOR & EQUIPMENT CO., Chicago, Ill., has appointed Walter H. Wassman as service manager, replacing P. H. Lash.

EDGE MOOR IRON WORKS, Edge Moor, Del., announces appointment of Russell T. Kerndl as chief engineer of welded fabrication.

CHAIN BELT CO., Milwaukee, Wis., announces election of John T. Brown, former sales manager, as a vice-president of the company.

BAY CITY SHOVELS, INC., Bay City, Mich., has let contract for a new factory building connecting with its present assembly division.

THE THOMPSON & LICHTNER CO., INC., Boston, Mass., announces appointment of Herman G. Protze as engineer in charge of laboratory work.

B. F. GOODRICH CO., Akron, Ohio, has promoted George J. Stritch to manager of the Manufacturers' Sales Division office in Detroit, Mich.

AMERICAN FOUNDRY EQUIPMENT CO., Mishawaka, Ind., announces promotion of Leslie L. Andrus from assistant sales manager to general sales manager.

THE PATTERSON FOUNDRY AND MACHINE CO., Widener Bldg., Philadelphia, Penn., announces appointment of George L. Anderson as sales engineer.

## ROCK PRODUCTS

**Waukesha Motor Co.**, Waukesha, Wis., has arranged for a 3-months' circle tour of Latin America via airways by its director of export sales, M. E. Nicklin.

**Foot Bros. Gear & Machine Corp.**, Chicago, Ill., has appointed H. F. Edge & Co., 987 Cox Ave., Atlanta, Ga., as district representative in the southeastern territory.

**American Chain and Cable Co., Inc.**, is the new name of an old Chicago, Ill., company, known heretofore as American Chain Co., Inc. The firm manufactures wire rope as well as chains.

**Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.**, Passaic, N. J., has opened a West Coast branch and warehouse at 778 Brannan St., San Francisco, Calif. A. R. Bradshaw is in charge.

**The Ironton Fire Brick Co.**, Ironton, Ohio, announces appointment of Interstate Supply & Equipment Co. (Harry R. Donald, president and treasurer), Milwaukee, Wis., as sales representative for Wisconsin.

**Lincoln Electric Co.**, Cleveland, Ohio, has placed Robert Daniels in charge of the Chattanooga, Tenn., office. William F. Fischer has been appointed to the sales staff of the San Francisco, Calif., office.

**Foot Bros. Gear and Machine Corp.**, Chicago, Ill., was recently awarded contract by TVA for operating machinery for segmental valves and lock gates for the Chickamauga and Guntersville Locks on the Tennessee River.

**Worthington Pump and Machinery Corp.**, Harrison, N. J., has absorbed its subsidiaries, including Carbondale Machine Corp. and Worthington Co., Inc., with offices in Seattle, San Francisco, Los Angeles and El Paso.

**Bristol's Instrument Co., Ltd.**, London, England, celebrated its fourth year of manufacturing Bristol instruments in England by moving into new and larger quarters at Brent Crescent, North Circular Road, West Twyford.

**Caterpillar Tractor Co.**, Peoria, Ill., has appointed Louis B. Neumiller as sales manager of its central sales division. Edw. W. Jackson has been promoted to general service manager, the position vacated by Mr. Neumiller.

**SKF Industries, Inc.**, Philadelphia, Penn., exhibited a full range of ball and roller bearings and transmission appliances at the 1937 Highway Exhibit, American Road Builders' Association, New Orleans, January 11-15.

**Precision Scientific Co.**, Chicago, Ill., has become sole manufacturer of Freas and Thelico constant temperature laboratory equipment, formerly built and sold by the Freas Thermo-Electric Co., Irvington, N. J., and Chicago, Ill.

**Four Wheel Drive Auto Co.**, Clintonville, Wis., is furnishing space in one of its showrooms for a 30-hour course of instruction in first aid for its employees. An American Red Cross certificate is awarded to those completing the course.

**Oliver United Filters, Inc.**, New York, N. Y., has promoted E. D. Flynn to chief engineer, with headquarters at Oakland, Calif. J. H. Mitchell-Roberts, export manager, left the latter part of January for an extended trip throughout the Far East.

**Lima Locomotive Works, Inc.**, shovel and crane division, Lima, Ohio, recently changed location of its Seattle and San Francisco offices, which are now, respectively, at 1932 First Ave. South, Seattle, Wash., and 200 Bush St., San Francisco, Calif.

**Link-Belt Co.**, Chicago, Ill., has named Erwin A. Wendell to succeed Howard L. Purdon as district sales manager at St. Louis, Mo., Mr. Purdon having been transferred to the Chicago office to assume sales responsibilities in Chicago territory.

**Bausch & Lomb Optical Co.**, Rochester, N. Y., announces that E. S. Bissell, technical adviser on industrial application in the company's instrument division since 1929, has joined the Mixing Equipment Co., Rochester, N. Y., as sales manager.

**George Haiss Mfg. Co., Inc.**, New York, N. Y., has appointed Howard W. Read Corp.,

600 N. Delaware Ave., Philadelphia, Penn., and Tennessee Tractor Co., 419 Twelfth Ave., South, Nashville, Tenn., as distributors in their respective territories.

**General Refractories Co.**, Philadelphia, Penn., recently inaugurated the following officers: Lionel V. Greene, vice-president in charge of operations; Russell P. Heuer, vice-president in charge of research; Drew M. Thorpe, vice-president in charge of sales.

**Allis-Chalmers Manufacturing Co.**, Milwaukee, Wis., announces that its subsidiary company, Condit Electrical Manufacturing Corp., Boston, Mass., is, since January 1, operating as a company unit now known as Allis-Chalmers Manufacturing Co.—Condit Works.

**General Electric Co.**, Schenectady, N. Y., announces that orders during 1936 increased 37% over orders in 1935. Jointly, General Electric Co., Babcock & Wilcox Co., and Bailey Meter Co. recently introduced the "Steamotive," a steam-generating unit of new type.

**The B. F. Goodrich Rubber Co. of Canada, Ltd.**, Kitchener, Ont., has named George W. Sawin, formerly Philadelphia district manager of Goodrich, as vice-president and general manager. This appointment fills the position left vacant by the recent death of Frank G. Morley.

**Ludlow-Saylor Wire Co.**, St. Louis, Mo., has transferred facilities previously maintained on Washington Avenue to the main group of buildings at Newstead Avenue and the Wabash Railroad, in order to give customers full benefit of complete factory stocks and deliveries.

**Farrel-Birmingham Co., Inc.**, Ansonia, Conn.: Executives and employees recently honored Franklin R. Hoadley, vice-president, with a testimonial dinner and gifts as evidence of their regard for him. Mr. Hoadley resigned January 1 to become president of Atwood Machine Co., Stonington, Conn.

**Gar Wood Industries, Inc.**, Detroit, Mich., recently appointed Engineering Industries, Ltd., Dominion Bldg., Leaside, Ont., as distributors for the company's heating and air conditioning products for Canada. Robert J. Grow has been named manager of Gar Wood's branch in Baltimore, Md., succeeding S. R. Faatz.

**Morse Brothers Machinery Co.** is the name of the new firm created January 1 with the purchase by Denver Metal and Machinery Co. of Morse Bros. Machinery and Supply Co., 2900 Broadway, Denver, Colo. Max Grimes is president, and J. T. McShane, vice-president of the new company. G. G. Morse has retired.

**Gar Wood Industries, Inc.**, Detroit, Mich., has appointed Ralph S. Jenkins as vice-president in charge of manufacturing of all its divisions. Mr. Jenkins comes from Minneapolis, Minn., where he resigned as general manager of St. Paul Hydraulic Hoist Co. He was previously associated with Gar Wood Industries from 1921 to 1932.

**General Electric Co.**, Schenectady, N. Y., has elected the following five new commercial vice-presidents: M. O. Troy, manager of the central station department; L. T. Blaisdell of Dallas, southwestern district manager; E. H. Ginn of Atlanta, southeastern district manager; A. L. Jones of Denver, Rocky Mountain district manager; and T. S. Knight of Boston, New England district manager.

**Timken Roller Bearing Co.**, Canton, Ohio, announces resignation of Frederick J. Griffiths as director of its organization and as president and director of The Timken Steel and Tube Co. W. Robert Timken, William E. Umstadd and H. H. Timken, Jr., are fulfilling the duties thus vacated. K. B. Bowman has resigned as general superintendent of the steel and tube mills of Timken Roller Bearing Co. and is succeeded by John E. Pick.

**Johns-Manville Corp.**, New York, N. Y., announces that E. M. Voorhees has resigned as secretary and treasurer, to become vice-chairman of finance committee and a director of U. S. Steel Corp. on April 1. Following this resignation, Johns-Manville has promoted Charles H. Roberts from general auditor to comptroller; Arthur Olsen to treasurer; Vandiver Brown from assistant secretary to secretary. W. I. Waite has been made secretary of the officers' board.

## Trade Literature

The following literature is available on request to the respective sponsor:

**Diesel Engines.** F-M Models 32-E, 33-D, 35-E, 36-A and 37-D are described in a 24-page booklet. FAIRBANKS, MORSE & CO., Chicago, Ill.

**Mechanical Rubber Goods.** Data Book 34, 48 pages, describes belting, packing, hose and moulded goods. QUAKER CITY RUBBER CO., Philadelphia, Penn.

**Pulverizers.** Catalog 15, 48 pages, covers a complete line of pulverizing and pulverized coal firing equipment. WHITING CORP., Harvey, Ill.

**Diesel Engines.** Form 3719, 28 pages, discusses five sizes of Diesel engines, from 44 to 160 hp. CATERPILLAR TRACTOR CO., Peoria, Ill.

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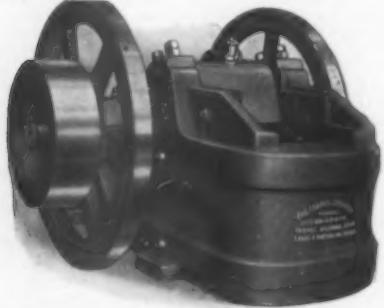
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Compressors. Two-stage, air-cooled portable compressors, electric driven, are discussed in a 4-page leaflet. INGERSOLL-RAND CO., New York, N. Y.

Diesel Engines. Specifications and photographs of a medium-speed, heavy-duty engine are given in a 4-page booklet. PAGE ENGINEERING CO., Chicago, Ill.

Industrial Cleaning. A broadside features the economics of vacuum cleaning. Central portable cleaning systems are mentioned. SPENCER TURBINE CO., Hartford, Conn.

Dust Collectors. "American dustube collector" is described and illustrated in Book 22, 24 pages. AMERICAN FOUNDRY EQUIPMENT CO., Mishawaka, Ind.

Kettles. Several designs of kettles, heated in various ways, are featured in a 4-page booklet. THE PATTERSON FOUNDRY & MACHINE CO., East Liverpool, Ohio.

Screen Cloth. Bulletin 98, 12 pages, deals with screen cloth for screening stone, sand, gravel, slag, oyster shells, etc. ROBINS CONVEYING BELT CO., New York, N. Y.

"Industrial Products." Form GI-6A-8-36 is a 60-page book on insulation, friction and electrical materials produced by JOHNS-MANVILLE, New York N. Y.

Batteries. A 24-page booklet deals with batteries for trucks, buses, tractors, etc. New Kathanode construction is included. THE B. F. GOODRICH CO., Akron, Ohio.

Hollow Drill Steel. A 4-page leaflet describes the manufacture of and gives general information on Ludlum hollow drill steel. LUDLUM STEEL CO., Watervliet, N. Y.

Stokers. Improved boiler operation effected by scientific combustion cycle of Link-Belt automatic firing is discussed in 28-page Book 1619. LINK-BELT CO., Chicago, Ill.

"Lower Piping Costs with Shielded Arc Welding" is a 12-page booklet. A 20-page booklet on "The New Arc Welding Technique" is also available from THE LINCOLN ELECTRIC CO., Cleveland, Ohio.

Speed Control. How twelve nationally-known manufacturers use Reeves speed control is detailed, with photographs, in a vest-pocket booklet of 32 pages. REEVES PULLEY CO., Columbus, Ind.

Boilers. Catalog 102, 20 pages, covers briefly several types of water tube boilers and such accessories as water walls, air pre-heaters and waste heat boilers. EDGE MOOR IRON WORKS, Edge Moor, Del.

Rooters. A new broadside describes the ripping action of "Rooters" so that sandstone, hard pan, cemented gravel and macadam, etc., can be moved without blasting. R. G. LE TOURNEAU, INC., Peoria, Ill.

Mixers. "Agitator and Mixer Book," Catalog 375, devotes 72 pages to all kinds of kettles, laboratory autoclaves, stirrers, digesters and agitators. THE PATTERSON FOUNDRY AND MACHINE CO., East Liverpool, Ohio.

Lathe. A 24-page catalog announces the 1937 model 9-inch Workshop Precision Lathe. Over 150 illustrations show styles and applications of new back-gearied, screw cutting lathe. SOUTH BEND LATHE WORKS, South Bend, Ind.

Material Handling Equipment. Notable improvements in design and construction of material handling equipment are published in a new catalog, together with many tables and drawings. GIFFORD-WOOD CO., Hudson, N. Y.

"Firebrick With a Reputation" is a folder on four types of refractory brick. "Ladrillos Refractarios" is a 40-page booklet with Spanish and English texts. HARBISON-WALKER REFRACTORIES CO., Pittsburgh, Penn.

"A Buyer's Guide to Diamond Mechanical Rubber Goods" is the title of a new 28-page illustrated catalog containing descriptions of over fifty mechanical rubber products and accessories. Also included are tables listing horsepower capacity and minimum pulley diameter for belts of various sizes and plies. THE B. F. GOODRICH CO., Akron, Ohio.

Wire Rope for Safety is discussed in a folder by MACWHYTE CO., Kenosha, Wis.

Appliances. Bulletin B lists, with full dimensions, standard appliances for anti-friction bearing mountings. BEARING APPLICATION CO., Ardmore, Penn.

Spray Nozzle. Bulletin 50, 8 pages, contains complete spray nozzle data and selection charts for all principal applications in the industrial field. BINKS MANUFACTURING CO., Chicago, Ill.

Scale. Bulletin 8134, 4 pages, describes a new multiple screw feed automatic weigher for any pulverized materials, bagging or bulk. RICHARDSON SCALE CO., Clifton, N. J.

Screw Conveyor Machinery. Section 107 of general catalog 100 is devoted to P-B screw or spiral conveyor machinery for elevating and conveying of materials. Specifications are included. PALMER-BEE CO., Detroit, Mich.

Manganese Steel Products: An "Index of Applications" Bulletin R-21, describes the qualities of Rol-Man manganese steel and lists the products available made of it. MANGANESE STEEL FORGE CO., Philadelphia, Penn.

"Safety" is the title of a new illustrated booklet on safety at work. It gives comments of 24 heads of large industrial enterprises regarding their work in safety. NATIONAL SAFETY COUNCIL, INC., Chicago, Ill.

Steam Turbines. Bulletin 1181, 20 pages, covers a standard line of high pressure, non-condensing steam turbine units of 3-valve reaction type. Photographs and drawings show construction. ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis.

Belting and Packing. Catalog 36, 96 pages, gives tables, technical data and general information regarding belting, hose, packings, rubber linings and related items. NEW YORK BELTING AND PACKING CO., Pasco, N. J.

Pressure Gauges. Catalog 6703, 72 pages, presents many kinds of thermometers and pressure gauges. Hygrometers for indicating, recording and controlling humidity and temperature are included. BROWN INSTRUMENT CO., Philadelphia, Penn.

Concrete Surfacing Machinery. "Berg" Model "G3" motor unit, "Berg" concrete vibrators and "Berg" surfacers are described in a small, illustrated leaflet and also in a complete catalog. CONCRETE SURFACING MACHINERY CO., Cincinnati, Ohio.

Separators. Type S Gast Separator for removing water and oil from either air or steam is introduced in a 4-page leaflet. The unit is designed for pressures up to 150-lb. Literature on Gast after-coolers is also available. THE JOHNSON CORP., Three Rivers, Mich.

Chain Drives. The 1936 edition of Data Book 125, 96 pages, presents up-to-date improvements in Silverstreak silent chain drives. It suggests 12 simple check-ups for the plant operator. Installation pictures and engineering data are included. LINK-BELT CO., Chicago, Ill.

Rotary Pumps. Bulletin HP-200 deals with a complete line of handpumps, used for transferring quantities of Diesel fuel from large storage tanks to small tanks located near the engine. Power driven pumps are treated in Bulletins DB-300 and IU-300. BLACKMER PUMP CO., Grand Rapids, Mich.

Diesel Tractors. "Caterpillar" Diesel RD8 is a big tractor for heavy jobs. Form 3346, a 48-page book, describes and illustrates this tractor of 6-cylinder design, 850 r.p.m., 95 hp. at the drawbar. Form 3712, 32 pages, discusses Diesel tractor RD4, which has drawbar horsepower of 35. CATERPILLAR TRACTOR CO., Peoria, Ill.

Refractories. An 8-page reprint of "Refractories Used in Lime Burning," by R. P. Heuer and L. J. Trostel, is available. This paper was read at the 1936 annual convention of the National Lime Association. (See ROCK PRODUCTS, July, 1936, page 62.) GENERAL REFRactories CO., Philadelphia, Penn.

ROCK PRODUCTS

# BUILT FOR THE PIT!

★ ★  
Fully enclosed cab that can be locked up.

★ ★  
Cast steel bases far superior to welded structural design  
—long life!

★ ★  
Side frames for operating machinery cast integrally with rotating base—no possible chance  
of misalignment of shafts in years of service.

★ ★  
Cool running smooth acting cone clutches.

★ ★  
Northwest Independent crowd that  
utilizes force that other shovels waste.

★ ★  
Welded boom and dipper sticks. No  
Northwest welded boom has ever  
failed.

★ ★  
Manganese front dipper.

★ ★  
Crawlers built for shovel service  
—beyond comparison with trac-  
tor crawlers furnished on many  
small machines.

★ ★  
Built in four capacities,  $\frac{3}{8}$ ,  
 $\frac{1}{2}$ ,  $\frac{5}{8}$  and  $\frac{3}{4}$  cu. yds.

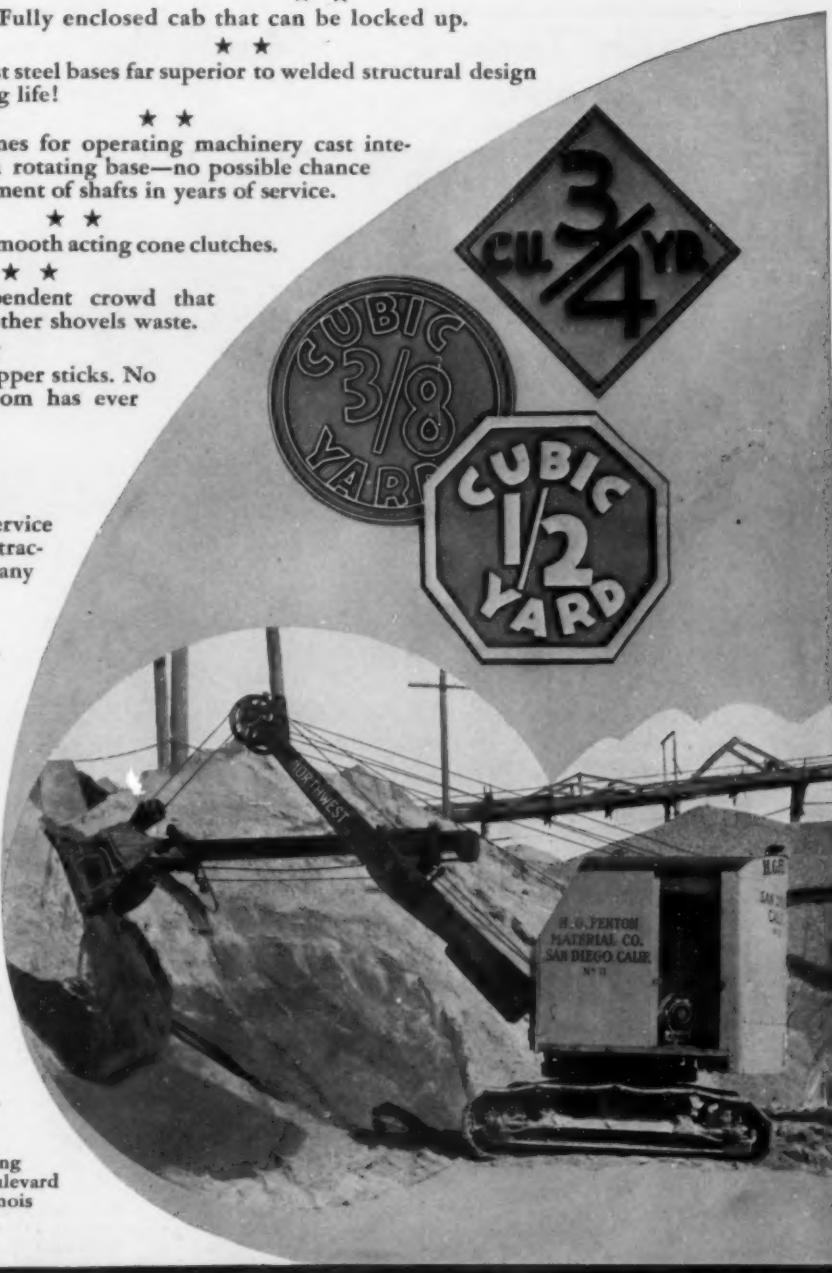
Other machines 1 cu. yd. ca-  
pacity and larger.

Gasoline, Oil, Diesel or  
Electric.

Model 18,  $\frac{1}{2}$  yd. Northwest  
Shovel working in the yards  
of the Fenton Material Co.  
at San Diego, California.  
This is the tenth North-  
west purchased by this  
concern over a period  
of thirteen years. Repeat  
orders tell the story of  
satisfactory service.

NORTHWEST  
ENGINEERING  
COMPANY

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Chicago, Illinois



SHOVEL . . . . .  
CRANE . . . . .  
DRAGLINE . . . . .  
TRUCK SHOVEL  
TRUCK CRANE

# NORTHWEST

BUILT IN A RANGE OF 17 SIZES— $\frac{3}{8}$  YD. CAPACITY AND LARGER

## What kind of action do you want?

Spectacular Throw?  
Pulverizing Action!



Yes—But It's Wasteful!

Mostly Heave—Controlled Throw?  
Spreading Action!



This Produces Results!

SOME BLASTS are great spectacles, throwing rock all over the lot, pulverizing, shattering close to the borehole. Plenty of action—but not so much favorable breakage. And how the costs do mount!

Less spectacular, but more effective, is the Atlas Apex blast that comes with a heaving, spreading action—distributing the stress throughout the burden. More favorable breakage, better throw of the rock, more economical shoveling—Apex represents controlled force in economical quarrying.

Apex action gives controlled force in three strengths, each strength having three velocities. The result is a flexibility that meets the peculiarities of most rock formations both in respect to hardness and structure. And Apex action often permits of increased spacing, thus saving drilling cost.

Many Quarrymen find that Apex is better suited to their needs. Let the Atlas Representative discuss its application to your own quarrying problems.

**ATLAS POWDER COMPANY, WILMINGTON, DEL.**

Cable Address—Atpowco

*Everything for Blasting*

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Memphis, Tenn.

New Orleans, La.  
New York, N. Y.  
Philadelphia, Pa.  
Picher, Okla.  
Pittsburg, Kansas

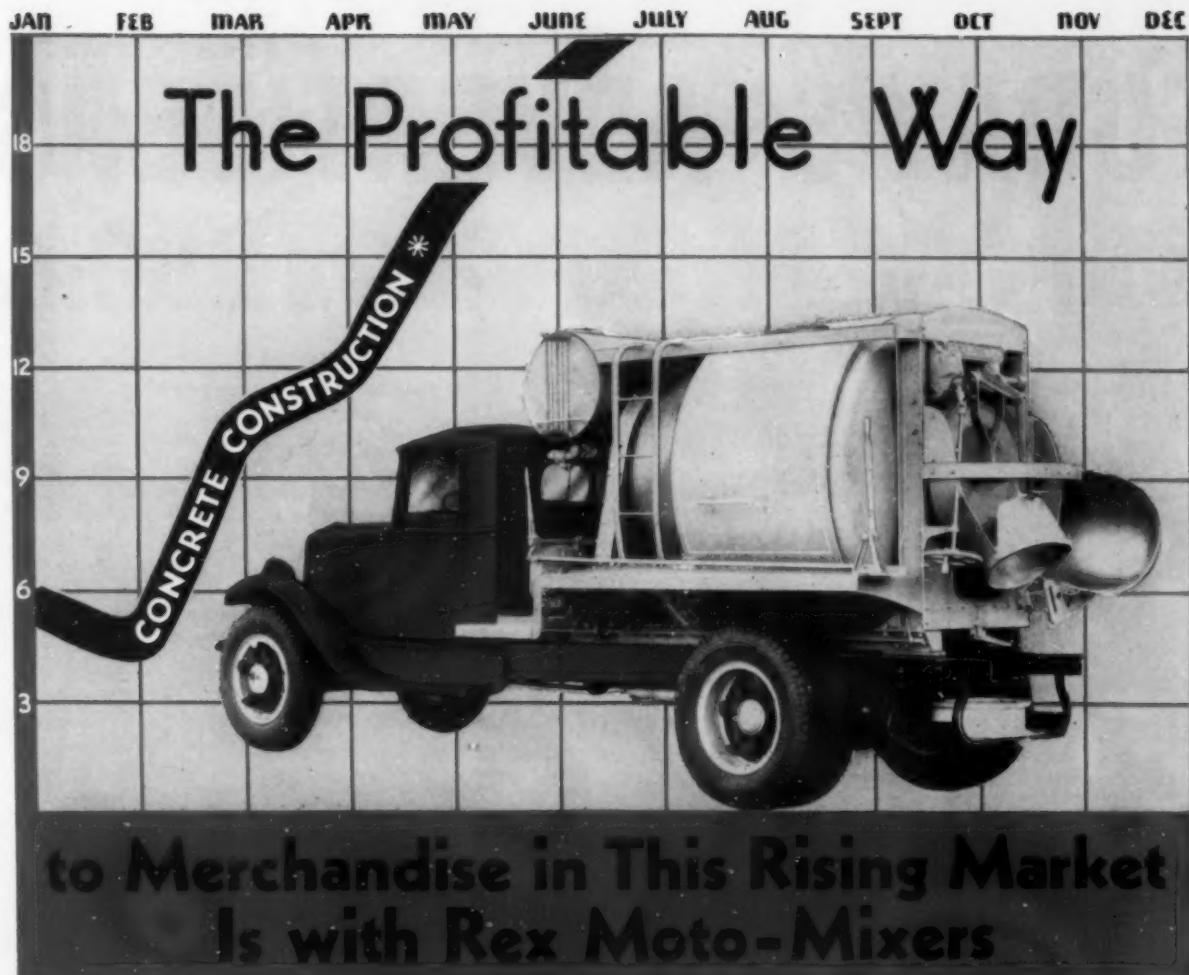
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Salt Lake City, Utah  
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E X P L O S I V E S





\*Concrete Construction in Millions of Cubic Yards Based on Cement Shipments

Cement, sand, gravel and stone are moving faster every month.

The profitable way to get your share of this market, to make your sand, gravel and stone move faster, is to mix and move them in Rex Moto-Mixers and Agitators.

Every month also finds more cement and more aggregate mixed and moved as ready-mixed concrete in Rex Moto-Mixers, and moved profitably.

Bigger Pay Loads and Lower Ton-Mile costs spell profit on every yard.

Investigate now this modern, profitable way of increasing tonnage, bettering margins with Rex Moto-Mixers.

Start by sending for the book "Rex Moto-Mixers and Agitators."

## CHAIN BELT COMPANY OF MILWAUKEE



*Moto-Mixers*



READY-MIXED CONCRETE

Send today for a copy of the book—"Rex Moto-Mixers and Agitators." It describes the 1937 way to secure a better margin on this modern, profitable method of selling cement and aggregates. It illustrates the new 1937 Rex Moto-Mixer features.

CHAIN BELT COMPANY  
1649 W. Bruce Street Milwaukee, Wis.



# **TODAY'S ADVERTISERS**

## **Will Build Next Year's Plants**

Increased profits in the rock products industries have financed vigorous modernization and development programs. Scores of new plants have been erected, enlarged and re-equipped in recent months.

More—many more plants are to be built and existing ones modernized to meet existing demands and even greater demands of the future. This reveals an outstanding opportunity to get in on the ground floor with effective sales effort.

Recent changes in corporation tax laws have furnished added incentive for development work and added appropriations for plant betterment. Research and development work may be preferred to large payments to the tax collector. Many corporations are pushing work in order to get their programs under way before the end of this first year.

Alert advertisers will take advantage of these situations by vigorous campaigning. Use **ROCK PRODUCTS** to reach the largest audience and the most plants in the rock products industry during 1937.

**March Forms  
Close Feb. 23rd**

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**A. B. C. . . . .      ROCK PRODUCTS      . . . . . A. B. P.**

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# A GREAT NEW BUSINESS FOR AGGREGATE PRODUCERS

Called "the greatest discovery in road construction in years" by the U. S. Bureau of Public Roads, stabilized soil roads to be built in the immediate future call for enormous quantities of material. This demand opens wide the door to an immediate, continuous and profitable market. The soil combinations used include not only ordinary aggregates but also portions of sand, silt and clay. Much of this material is available at hand, from pit overburden or waste piles from washing. Aggregates producers generally have most of the equipment necessary for mixing and loading also, so it costs them very little to get into a very big business — a business which will be taken care of by state and county owned pits and plants unless aggregates producers are on their toes.

## Binder Soils and Calcium Chloride the Secret of Success

The binder soil, generally clay or clay loam, exerts tremendous bonding force when in a damp or plastic state. Calcium Chloride attracts, holds and regulates the moisture, to keep clay damp and dustless and to prevent crumbling or separating of aggregates and binder soils. These effective binder soils are generally waste to pit owners, yet absolutely necessary in stabilized soil mixtures. Thus is waste turned to profit.

### Free Information on How to Build

The Calcium Chloride Association has data and drawings showing details of plant construction. Write for them now. Get your share of the business this year.

### CALCIUM CHLORIDE ASSOCIATION

Solvay Sales Corporation . . . . . 40 Rector Street, New York City  
Michigan Alkali Company . . . . . 60 E. 42nd Street, New York City  
The Dow Chemical Company . . . . . Midland, Michigan  
The Columbia Alkali Corporation . . . . . Barberton, Ohio



A typical stabilization plant set-up. Aggregates, binder-soil and calcium chloride are fed into a pug-mill, thoroughly mixed, and conveyed to a loading bin for delivery to trucks.

### MANY MARKETS

Rural Roads  
City Streets  
Park, Cemetery and Private Drives  
Factory and Public Parking Areas  
Tennis Courts, Playgrounds, etc.



Plant-mixed stabilized material on road, ready for spreading and shaping.



A smooth, dustless, all-weather road produced with plant-mixed stabilized material.

# CALCIUM CHLORIDE

FOR STABILIZING ROAD SURFACES

# Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

*For alphabetical index, see page 2*

**Acetylene Welding Rod**  
American Steel & Wire Co.  
(U.S. Steel Corp. Subsidiary)

**Aggregate De-dusters**  
Western Precipitation Co.

**Aggregate Admixture**  
Calcium Chloride Ass'n

**Agitators, Thickeners and Slurry Mixers**  
Hardinge Co., Inc.  
F. L. Smith & Co.

**Airveyor**  
Fuller Co.

**Air Compressors**  
Fuller Co.  
Gardner-Denver Co.  
Nordberg Mfg. Co.  
F. L. Smith & Co.  
Sterling Machinery Corp.  
Taylor Engr. & Mfg. Co.

**Air Filters**  
Fuller Co.

**Air Separators**  
Bradley Pulverizer Co.  
Hardinge Co., Inc.  
Raymond Bros. Impact Pulv. Co.  
W. W. Sly Mfg. Co.  
Sturtevant Mill Co.  
Williams Patent Crusher & Pulv. Co.

**Applicator Bars**  
Stulz-Sickles Co.

**Babbitt Metal**  
Joseph T. Ryerson & Son, Inc.

**Backdiggers**  
Lima Locomotive Works, Inc.  
(Ohio Power Shovel Co.)

**Backfillers**  
Bucyrus-Erie Co.  
Harnischfeger Corp.  
Lima Locomotive Works, Inc.  
(Ohio Power Shovel Co.)

**Balls, Grinding (See Grinding Balls)**

**Balls (Tube Mill, etc.)**  
Allis-Chalmers Mfg. Co.  
Hardinge Co., Inc.  
F. L. Smith & Co.

**Bar Benders and Cutters**  
Koehring Co.

**Batchers, Measuring Volume**  
Besser Mfg. Co.  
Fuller Company

**Bearings**

Chain Belt Co.  
Link-Belt Co.  
Joseph T. Ryerson & Son, Inc.  
Timken Roller Bearing Co.

**Bearings (Anti-Friction)**  
Timken Roller Bearing Co.

**Bearings (Roller)**  
Timken Roller Bearing Co.

**Bearings (Tapered Roller)**  
Timken Roller Bearing Co.

**Bearings (Thrust)**  
Timken Roller Bearing Co.

**Belt Fasteners**

Flexible Steel Lacing Co.

**Beltting**  
Robins Conveying Belt Co.  
Thermoid Rubber Co.

**Belt Lacing (Steel)**  
Flexible Steel Lacing Co.

**Belt (Elevator and Conveyor)**  
B. F. Goodrich Co.  
Thermoid Rubber Co.

**Belt (Metal, Conveyor, High and Low Temperature)**  
Wickwire Spencer Steel Co.

**Belt (Transmission)**  
B. F. Goodrich Co.  
Thermoid Rubber Co.

**Belting (V Type)**

B. F. Goodrich Co.  
Thermoid Rubber Co.

**Bin Gates**

Allen-Sherman-Hoff Co.  
Chain Belt Co.  
Fuller Co.  
Industrial Brownhoist Corp.  
Link-Belt Co.  
Sprout, Waldron & Co., Inc.  
Traylor Engr. & Mfg. Co.

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Besser Mfg. Co.  
Blaw-Knox Co.  
Traylor Engr. & Mfg. Co.

**Blasting Cap Protectors**

B. F. Goodrich Co.

**Blasting Machines**

Atlas Powder Co.

**Blasting Supplies**

Atlas Powder Co.

**Blasting Powder (See Powder, Blasting)**

**Block Machines, Building**  
Besser Mfg. Co.  
Miles Mfg. Co.  
Multiplex Concrete Machy. Co.  
Stearns Mfg. Co.

**Block Machines, Silo**

Besser Mfg. Co.

**Blocks (Pillow, Roller Bearing)**  
Link-Belt Co.  
Timken Roller Bearing Co.

**Blowers**

W. W. Sly Mfg. Co.

**Bodies (Car & Motor Truck)**  
Easton Car & Construction Co.  
Hug Co.

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Babcock & Wilcox Co.  
Combustion Engineering Corp.

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B. F. Goodrich Co.

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Smith Engineering Works  
Williams Patent Crusher & Pulv. Co.

**Brick Machines**

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Multiplex Concrete Machy. Co.

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Geo. Haiss Mfg. Co., Inc.  
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**Hayward Company**  
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**Owen Bucket Co.**

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Bucyrus-Erie Co.  
Owen Bucket Co.

**Page Engineering Co.**  
Wellman Engineering Co.

(G. H. Williams)

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**Buckets (Elevator and Conveyor)**

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Hendrick Mfg. Co.

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**Jeffrey Mfg. Co.**

**Link-Belt Co.**

**Robins Conveying Belt Co.**

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**Koehring Co.**

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American Steel & Wire Co.  
(U.S. Steel Corp. Subsidiary)

**Broderick & Bascom Rope Co.**

**Link-Belt Co.**

**John A. Roebling's Sons Co.**

**Sauerman Bros.**

**Wellman Engineering Co.**

(G. H. Williams)

**Williamsport Wire Rope Co.**

**Calcinators**

Bradley Pulverizer Co.

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J. B. Ehram & Sons Mfg. Co.

**Calcium Chloride**

Calcium Chloride Assn.

**Cap Crimpers and Fuse Cutters**

Ensign-Bickford Co.

**Caps (Blasting)**

Atlas Powder Co.

**Car Pullers**

Link-Belt Co.

**Cars and Track, Industrial**

Besser Mfg. Co.

**Chase Foundry & Mfg. Co.**

**Cars (Quarry & Gravel Pit)**

Easton Car & Construction Co.

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Babcock & Wilcox Co.

Birdsboro Steel Fdry. & Mach. Co.

C. G. Buchanan Co., Inc.

Eagle Iron Works (Grey Iron)

Link-Belt Co.

Timken Roller Bearing Co.

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F. L. Smith & Co.

**Cement Paints**

Tamms Silica Co.

**Cement Process**

Cement Process Corp.

**Cement Pumps**

Fuller Co.

F. L. Smith & Co.

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Blaw Knox Co.

Chain Belt Co.

**Chain (Dredge and Steam Shovel)**

Bucyrus-Erie Co.

Jeffrey Mfg. Co.

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Chain Belt Co.

**Chain (Elevating and Conveying)**

Chain Belt Co.

Jeffrey Mfg. Co.

Link-Belt Co.

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Calcium Chloride Ass'n.

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Besser Mfg. Co.

Multiplex Concrete Machy. Co.

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**Classifiers**

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Hardinge Co., Inc.

Link-Belt Co.

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Bonnot Company

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American Steel & Wire Co.

(U.S. Steel Corp. Subsidiary)

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**Williamsport Wire Rope Co.**

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Williams Patent Crusher & Pulv. Co.

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Babcock & Wilcox Co.  
Bonnot Company  
Bradley Pulverizer Co.  
Gruendler Crusher & Pulv. Co.  
Hardinge Company, Inc.  
Pennsylvania Crusher Co.  
Raymond Bros. Impact Pulv. Co.  
F. L. Smith & Co.  
Williams Patent Crusher & Pulv. Co.

**Colors, Cement**  
Geo. S. Mepham Corp.  
Tamms Silica Co.

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Cleveland Rock Drill Co.

**Compressors (See Air Compressors)**

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Universal Concrete Pipe Co.

**Concrete Slab Raising Equipment (Mud-Jack)**  
Koehring Co.

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**Conveyer Idlers and Rolls**  
C. O. Bartlett & Snow Co.  
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Jeffrey Mfg. Co.  
Link-Belt Co.

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Allen Sherman Hoff Co.  
Earle C. Bacon  
Besser Mfg. Co.  
Chain Belt Co.  
Fuller Company

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Harnischfeger Corp.

Industrial Brownhoist Corp.

Koehring Co.

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(Ohio Power Shovel Co.)

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Northwest Engineering Co.

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# The GULF ENGINEER cooperates

WITH PLANT MEN TO GET  
BETTER LUBRICATION  
AND LOWER OPERATING  
COSTS



● Here is the Gulf engineer on the job—teamed up with the plant engineer in charge of the boiler room. The enclosed worm gear drive for the bowl mill, which pulverizes coal, must be protected with the proper lubricant. And the Gulf engineer is there to look over the equipment and recommend the right lubricant for the job.

This service is a *plus value* which users of Gulf lubricants receive. For the Gulf engineer has a thorough knowledge of all phases of power plant lubrication.

He has worked with all types of equipment, new and old. The Gulf line includes more than 400 oils and greases and he is prepared to recommend the proper lubricant and the best application method for each bearing, gear or moving part.

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**GULF OIL CORPORATION ★ GULF REFINING COMPANY**

GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

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**Cranes (Excavator)**  
Koehring Co.

**Cranes (Overhead Traveling Electric)**  
Harnischfeger Corp.,  
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**Crusher Parts**  
American Pulverizer Co.,  
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Co.

C. G. Buchanan Co., Inc.  
Pennsylvania Crusher Co.  
Taylor-Wharton Iron & Steel  
Co.

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Co.

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Gruendler Crusher & Pulv. Co.

Jeffrey Mfg. Co.

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Williams Patent Crusher &  
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C. G. Buchanan Co., Inc.

Gruendler Crusher & Pulv. Co.

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Lewistown Fdy. & Mach. Co.  
(Jaw)

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Taylor Engr. & Mfg. Co.

Williams Patent Crusher &  
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F. M. Welch Engineering  
Service

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**Crushers (Roll)**  
American Pulverizer Co.

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Co.

New Holland Machine Co.

Williams Patent Crusher &  
Pulv. Co.

**Crushers (Rotary)**  
American Pulverizer Co.

J. B. Ehrsam & Sons Mfg  
Co.

**Crushers (Single Roll)**  
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Gruendler Crusher & Pulv. Co.

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Link-Belt Co.

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New Holland Machine Co.

Pennsylvania Crusher Co.

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Birdsboro Steel Foundry &  
Mach. Co.

C. G. Buchanan Co., Inc.

Jeffrey Mfg. Co.

New Holland Machine Co.

Sturtevant Mill Co.

Taylor Engr. & Mfg. Co.

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Harnischfeger Corp.

Link-Belt Co.

Northwest Engineering Co.

Page Engineering Co.

Thew Shovel Co.

**Draglines (Gasoline or Electric)**  
Koehring Co.

**Dragline Cableway Excavators**  
Bucyrus-Erie Co.

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**Dragline Excavators**  
Bucyrus-Erie Co.

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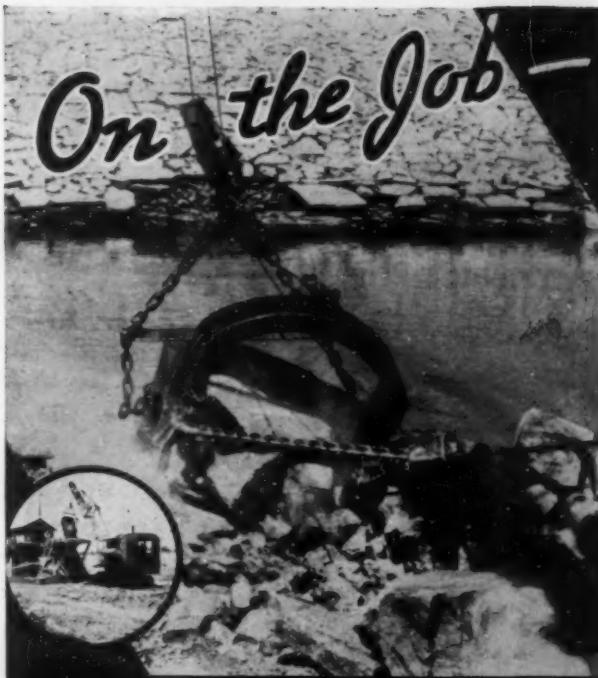
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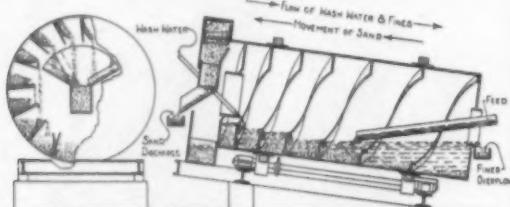
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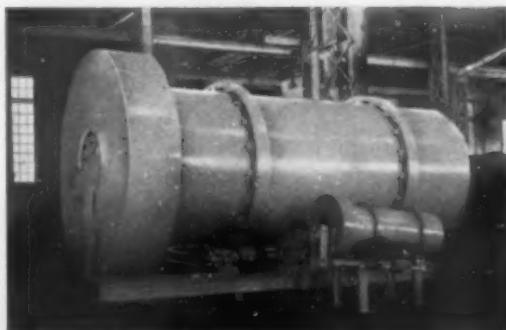
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NEW YORK—122 E. 42nd St. CHICAGO—205 W. Wacker Drive  
SAN FRANCISCO—501 Howard St. DENVER—617 17th St.

**The WHY  
of the INTEGRAL  
SPIRAL  
of the  
Hardinge Counter-Current  
Classifier and Washer**



A Large Counter-Current Classifier or Washer and Its Baby Used for Classifying or Cleaning Sand, etc.



2'x6' Double Mounted on Loader

## Start the Year With Larger PROFITS

Cut down repair costs—increase output—produce more accurately sized material. You can do it just as all users are doing it by using the highly efficient modern SIMPLICITY GYRATING SCREEN.

The SIMPLICITY is truly a superior screen with the original counter balanced eccentric shaft—rubber cushioned power—angle adjustment—heavy duty ball or roller bearings, etc.

Data secured from many actual operations using Simplicity Screens enable Simplicity engineers to make definite recommendations and guarantee results.

The Simplicity Gyrating Screens are furnished with either flat pulley drive, V-belt drive, or direct motor drive, and will grade larger tonnages with higher screening efficiencies than can be secured by using any other screen of comparable size.

Let us send the complete undisputed facts. Write us today.

**SIMPLICITY**  
ENGINEERING COMPANY  
DURAND, MICHIGAN

**STOP the DUST nuisance  
and hazard--at  
LOWEST COST**



### USE A SLY DUST CONTROL SYSTEM

Sly Dust Filters do a thorough job of collecting dust. They are outstanding in performance because of the exclusive filter bag arrangement shown at right. Note the tiers of flat cloth bags. On the left the open end is attached to a steel frame; on the right they are held by a compression-spring hook which keeps bag taut for the most effective dust removal by a simple motor shaker. Individual bags are quickly changed without interruption in service of filter.



Sly Dust Filters are thoroughly standardized for low first cost, and designed for low cost operation. Write us. Near you, we have an experienced and competent representative who will gladly analyze your problem and make recommendations. Sly guarantees results.

**SLY CLOTH BAG  
Dust Filters  
FOR DUST CONTROL**  
SUPPRESSION...POSITIVE COLLECTION...DISPOSAL

**THE W.W. SLY MANUFACTURING CO.  
4730 Train Ave., Cleveland, Ohio**

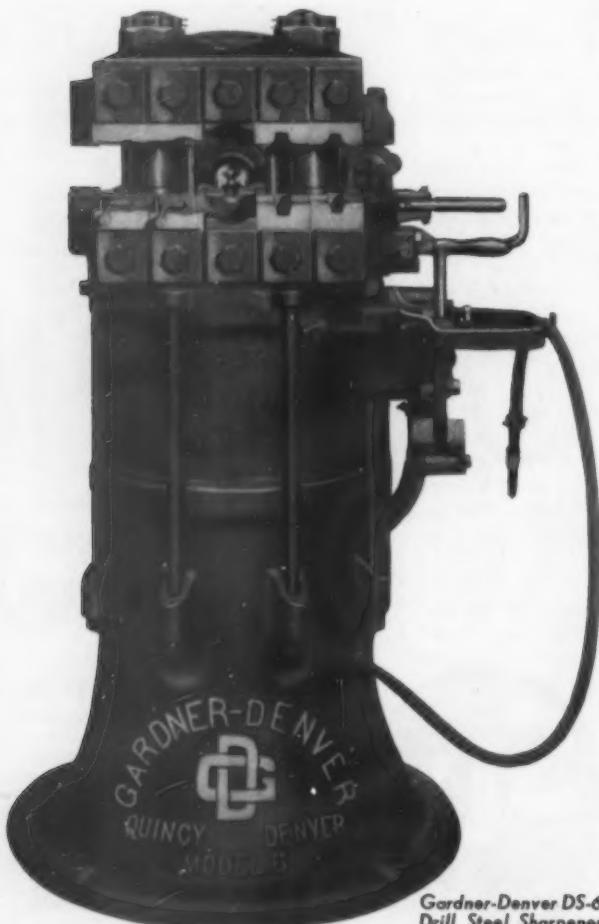
# The POWER You Need The ECONOMY You Want ..In Gardner-Denver Drill Steel Sharpeners

**Tandem Clamping Pistons**—provide maximum clamping power for all operations.

**Economy**—for fullering and swaging, air is admitted to only one piston.

**Long Life**—all moving parts of the Sharpener and Hole Puncher are lubricated from an integral reservoir.

Gardner-Denver Drill Steel Sharpeners have exclusive features that assure greater satisfaction. Write us for Bulletin DSE-2, which contains complete information.



Gardner-Denver DS-6  
Drill Steel Sharpener

**GARDNER-DENVER COMPANY**  
QUINCY, ILLINOIS • SINCE 1859

**GARDNER-DENVER**

## FOR THIS SERVICE CABLE MUST BE TOUGH

IT'S  
TELLURIUM



### TRY IT ON YOUR ELECTRIC SHOVELS

THIS is the story of a visit to a large West Virginia coal mine in search of information on G-E tellurium-rubber cable.

Our party, accompanied by the superintendent, rode the cars three miles to the face, where we found this loading machine going full blast.

Through the din and dust, we viewed the action. As the cars banged in and out, we tried to watch the cable. Sometimes it was buried in the ever-moving coal; once it was under the tractor tread of the loader. Then it was on top of a car; next time, under the wheels of a car. These things happened despite the helper's efforts to take care of the cable.

#### Cable Was in Good Shape

The photograph, unretouched, shows the cable rather clearly. Those several tapings covered bruises, the operator said, where the cable was jammed by a "motor" up against the solid block of the loader. Aside from these, however, the cable was in good shape, with few nicks and no signs of wear.

The operator swore that the cable was *great*. The superintendent concurred—said that it was giving excellent service. The same opinion was expressed by other mining men to whom we talked.

#### Try Out Tellurium Cable

When next you need cable for replacement on any of your cutters, loaders, reel locomotives, electric shovels, or other portable equipment, give G-E tellurium-rubber cable a trial. It is really tough stuff and will give the best of service. Your G-E jobber can supply all types and sizes promptly. For prices and specifications, see Bulletins GEA-1728 and GEA-1918. Address nearest G-E jobber, G-E sales office, or General Electric, Dept. 6A-201, Schenectady, N. Y.

This ad is one of a series written after visits to coal mines in Pennsylvania, West Virginia, and Ohio. Names of the mines and of the men interviewed will be furnished upon request.

520-98

**GENERAL ELECTRIC**

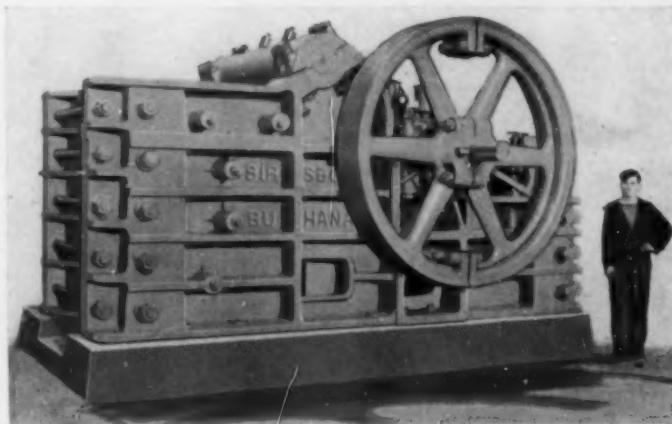
# Treat 'em Rough—*they like it!*

You don't need to feed a Birdsboro-Buchanan crusher with a teaspoon! It's built of steel, so designed to give the greatest structural strength. Large and tough rock is easily crushed to the desired size. Just run the cars or trucks up to the crusher and dump them in. It has the stamina to withstand the roughest treatment.

That Birdsboro-Buchanan crushers have proven strength is evidenced by the prominent plants using this equipment.

Birdsboro-Buchanan crushers are built with a "margin of safety" that insures them longer life.

May we tell you more about some specific installations?



## C. G. BUCHANAN CRUSHING MACHINERY DIVISION

*of BIRDSBORO STEEL FOUNDRY & MACHINE CO.*

90 West St., New York, N. Y.

REPRESENTED IN CANADA BY FRASER & CHALMERS OF CANADA, LTD., 1411 CRESCENT ST., MONTREAL, QUE., G. E. Sanctor, Gen. Mgr.



"FOR HIGH SPEED WORK,  
GIVE ME A MICHIGAN!"

I've run lots of shovels in my time and I know what a real day's work with the ordinary type means, too! That's why I'm strong for the MICHIGAN . . . For several years now, the boss has bought MICHIGAN Truck Shovels for the high speed jobs. He knows that Michigan's AIR CONTROLLED CLUTCHES are faster, and they keep his operators at top efficiency without fatigue ALL DAY. . . . Fingertip Air Controls are not new with the MICHIGAN. Their dependability has already been proved by seven years of actual use.

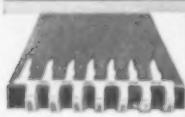
AIR CONTROLS are but ONE feature—Write for the MICHIGAN DATA BOOKLET "RP" today.

Michigan Truck Shovel— $\frac{3}{4}$  yard capacity—25 m.p.h. road speed.

**MICHIGAN POWER SHOVEL CO.**  
MILLER ROAD  
BENTON HARBOR MICH.

# ALLIGATOR

TRADE MARK REG. U.S. PAT. OFFICE  
STEEL BELT LACING



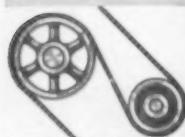
The compression grip protects belt ends.



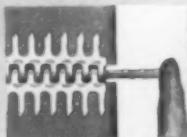
JUST A HAMMER TO APPLY IT



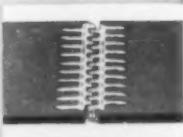
Smooth on both faces.  
Embeds in belt.



For all belts—all speeds. Flexible.



Rocker Hinge Pin.  
Separable joint.



Great strength.  
Long life.



Made also in "Monel Metal" and non-magnetic alloy for special service, and in long lengths for wider belts.

*Sole Manufacturers*  
**FLEXIBLE STEEL LACING CO.**  
4684 Lexington Street Chicago, Illinois  
In England at 135 Finsbury Pavement,  
London, E. C. 2



## Do you know the answers?

What is the most economical method of moving daily 100 to 2,000 tons of sand and gravel from a river-bed to a screening plant?

If you had a problem of digging gravel from a high hill and delivering to a plant at the toe of the hill, what equipment would you use?

How would you set up a drag scraper to pile a maximum tonnage of gravel, crushed stone or other materials on an area 700 ft. long and 300 ft. wide?

Questions like the above and hundreds of others are answered in the new Sauerman Catalog No. 18.

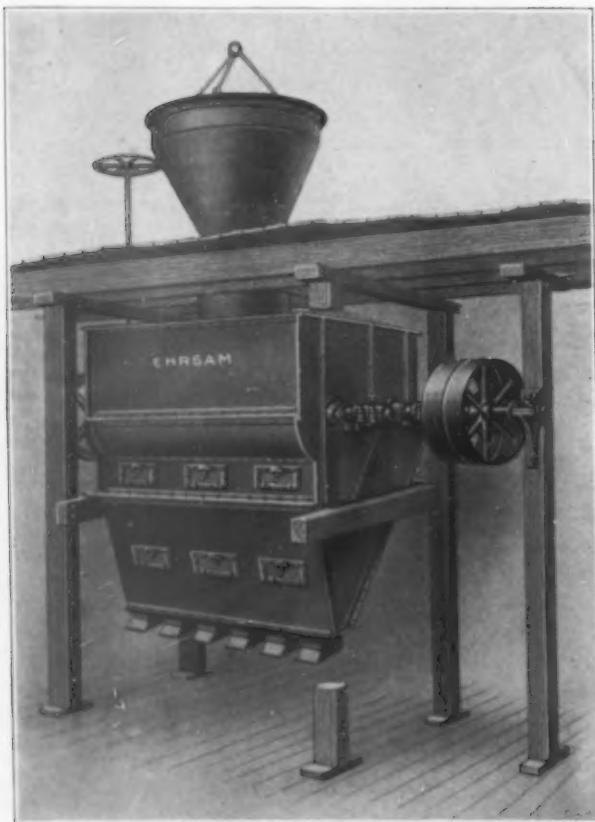
### Just off the press!

A copy of this 84-page book should be in the hands of all who have problems of digging, storing and reclaiming mineral aggregates. Write for YOUR copy today.



**SAUERMAN BROS., INC.**

430 S. Clinton St., Chicago



## THE EHRSAM Double Barrel Plaster MIXER

For Mixing Dry Ingredients Such as Plaster-Paris or Stucco with Fibre and Retarder. Also various Ingredients with Stucco, Portland Cement, Lime and Sand.

Equipped for Hand Sacking or Bates Bagger.

Used in Gypsum Plaster Mills Throughout the United States.

Capacities from Ten to Twenty Tons per Hour.

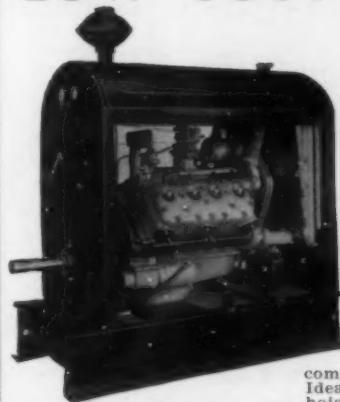
We specialize in the manufacture of calcining kettles, crushing and grinding equipment for gypsum plaster plants. Also the manufacture of wet mixers, forming machines and automatic cut-off machines and other equipment for the manufacture of gypsum wall board.

We also have complete engineering service for the lay-out and general design of such plants.

Chicago Sales Rep.:  
W. H. KENT, 549 W. Washington Blvd., Chicago

**The J. B. Ehksam & Sons Mfg. Co.**  
ENTERPRISE / KANSAS  
X ————— X

## LOW COST POWER with this KRW FORD V8 UNIT



Here's dependable, low-cost power up to 60 H.P.—complete, compact portable. Ideal for compressors, pumps, hoists, belt conveyors, bucket elevators, crushers, drag lines, drag scrapers, dryers, portable conveyors, loaders, blast hole drills, welders, etc., etc. Assembled with brand new heavy duty Ford V8 Truck engine. Large capacity radiator protected by heavy screen. Engine rubber mounted—outfit complete with governor, gas tank, 17 plate battery, instruments and louvered side panels to thoroughly enclose the engine.

Write for complete information, price, and data showing how this unit will pay for itself out of savings in a few weeks, whether operated on gasoline or natural gas. You can buy thru your Ford Dealer and benefit by local service and low-cost Ford engine replacement feature.

**K. R. WILSON** 3 Lock St. **Buffalo, N.Y.**

Exclusive Builder of Approved Ford Shop Equipment Since 1916

Also K RW  
ELECTRIC PLANTS  
20 KW outfit with dual voltage take-off for handling both light and power requirements simultaneously.

ROPE-REEVE • POWER-WHEEL • LEVER-ARM

# Buckets

capacities  
1/2 to 15  
yards



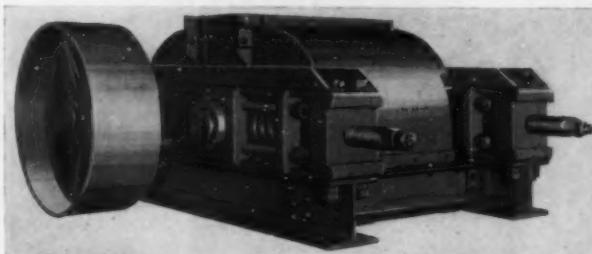
The right type and size for every kind of work. Write for Catalog.

## INDUSTRIAL BROWNHOIST

GENERAL OFFICES: BAY CITY, MICHIGAN  
New York, Philadelphia, Cleveland, Chicago

## GREENVILLE ROLL CRUSHERS

Designed Along Sound, Practical Engineering Principles  
WITH OR WITHOUT FEEDERS



**COMPACT, POWERFUL, DOUBLE ROLL CRUSHERS**

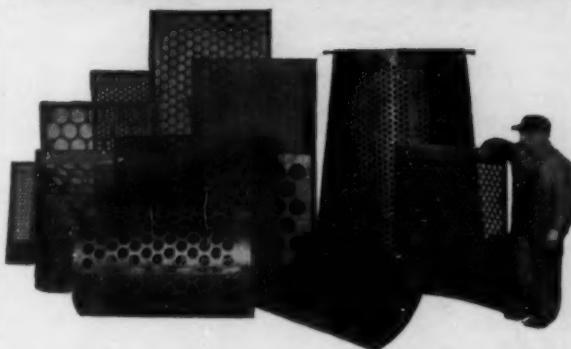
MADE IN ALL SIZES  
CORRUGATED OR PLAIN  
TO MEET ALL CONDITIONS

Convert your SURPLUS SIZES of gravel or crushed stone into MARKETABLE MATERIAL

Write your requirements to the

**F. M. WELCH ENGINEERING SERVICE**  
GREENVILLE, OHIO

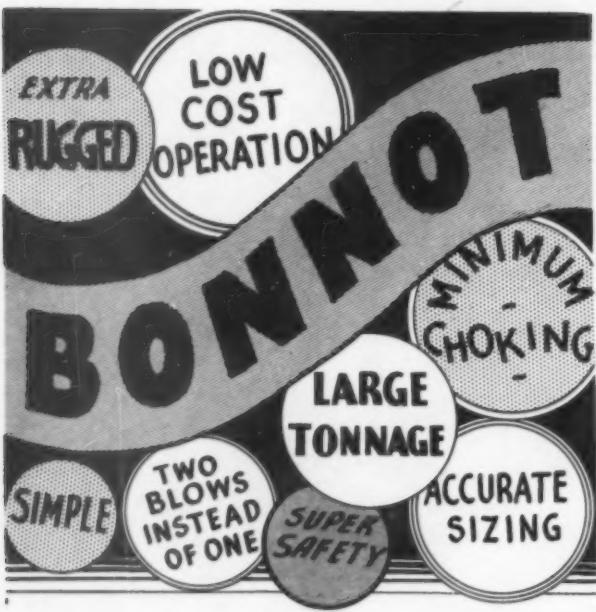
## SCREENS of Perforated Metal



For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

**The Harrington & King Co.**  
PERFORATING

5650 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N.Y.

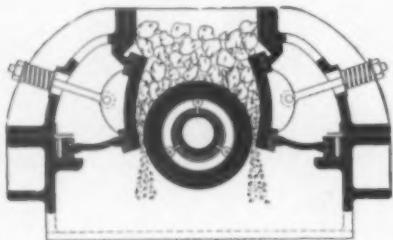


## THE CRUSHER OF PROFITABLE FEATURES

The above advantages are made possible by such features as Reversible Concaves—Cast Steel Frames—Bronze Steel Bearings—Renewable Liners—Extra Large Shaft—Positive Pressure Lubrication—Cast Iron Safety Plates and other profit producing features.

BONNOT Reduction Crushers assure less maintenance. There is no rubbing or abrasive action to produce fines and no oversize or slabs in finished product.

The BONNOT Reduction Crusher saves by reducing power cost. Perfect crushing with snap action produces 30 tons per hour of 1" minus material with less than 9 horsepower. Here then is a crusher that represents all that is desirable and profitable in this type of equipment.



*Not a roll crusher. Featuring slow creep mantle for distribution of wear*

Manufactured under U. S. Patent No. 1946763

**THE BONNOT CO.**  
CANTON, OHIO  
— SINCE 1891 —  
New York Office: 50 Church Street

WRITE  
FOR  
BULLETIN  
NO. 150  
TODAY

# SPECIALISTS DUST & FUME CONTROL

FOR MORE THAN A  
QUARTER OF A CENTURY

Every phase of Dust and Fume control has been studied by Engineers of this Corporation during more than a quarter of a century. Various types of equipment designed and installed by us to meet specific conditions have resulted in aggregate savings of millions of dollars to industry during this period. This experience and the equipment available are offered to any organization that has a dust problem.

## MULTICLONE

Multiclones are a system of small tubular separators in which the centrifugal force is hundreds of times stronger than gravity. All-metal, fire-proof, compact, flexible as to capacity and highly efficient, Multiclones require minimum operating and maintenance expense. They have the double purpose of cleaning waste gases from boilers or furnaces or exhaust gases from crushers, kilns or other apparatus, and separating dry powders in commercial production processes.

## COTTRELL ELECTRICAL PRECIPITATORS

Used internationally for cleaning waste gases and recovering valuable materials in smelters, cement plants, petroleum refineries, gas and coke works, paper mills and various chemical industries. Efficiencies as high as 99 plus percent have been obtained. Every important copper smelter in the United States and Canada is provided with a Cottrell process department.

We will be glad to consider your dust problems

**WESTERN PRECIPITATION CORPORATION**  
1016 W. 9th St., Los Angeles, Calif. • 405 Lexington Ave., New York  
Precipitation Co. of Canada, Ltd., Dominion Square Bldg., Montreal  
COTTRELL ELECTRICAL PRECIPITATORS . . . PEEBLES SPRAY DRYERS

## AMERICAN HAMMER MILL



Front View Showing Breaker Plate Adjustment

Manganese steel grinding parts, alloy steel shaft and SKF spherical roller bearings assure LOW MAINTENANCE COST. The AMERICAN mill is LOW IN FIRST COST—EASY TO INSTALL, DISMANTLE AND MOVE. It makes a more uniform product with minimum fines and no slivers or chips.

An excellent investment from every standpoint. Write for complete details.

**AMERICAN PULVERIZER COMPANY**  
1245 MACKLIND AVENUE, ST. LOUIS, MO.

## CROSS

DIE PERFORATED PLATES  
FOR YOUR TYPE OF SCREEN

### CROSS Screen Plates and Sections Save Money Because

They are . . . .



SELF FRAMING  
LONG WEARING  
MORE EASILY INSTALLED  
BLIND LESS  
IMPROVE PRODUCT

CROSS Screens are durable, accurate and scientifically designed. They are made of specially specified Steel in all standard sizes of Round, Square, Hexscreen, and Slot holes, for Cylindrical, Conical, Vibrating and Shaking Screens.

PROMPT DELIVERIES

## CROSS ENGINEERING CO.

MAIN OFFICE AND MFG. PLANT  
CARBONDALE, PA.  
Sales Offices Principal Cities

# Free Service to Subscribers

**RESEARCH SERVICE DEPARTMENT**  
Rock Products and Cement and Engineering News  
205 W. Wacker Drive, Chicago, Ill.

Please send me catalogs and prices concerning the items checked below:

Hoists for Concrete	Mixers, Continuous.	Posts and Standards.	Scales.	Tanks, Wood.
Buckets.	Mixers, Delivery.	Ornamental and	Scrapers.	Testing Equipment.
Hoses, Air Drill.	Mixers, Mortar and	Lighting.	Screening Equipment.	Thermometers,
Hose, Pneumatic Tool.	Plaster.	Power Transmitting	Screens.	Recording.
Hose, Steam.	Mixers, Ready-Mix	Equipment.	Septic Tank Molds.	Ties, Wall.
Hose, Water.	Concrete Bodies.	Processors.	Sidewalk and Curb	Tile Machines,
Hydrated Lime.	Monolithic Silo Forms.	Pulverizers.	Forms.	Building.
Hydraulic Dredges.	Motors.	Pumps.	Silo Doors, Hardware	Tile Machines, Drain.
Industrial Railways.	Motor Truck Dump	Pyrometers.	and Scaffolds.	Hoisting.
Instruments, Builders.	Bodies.	Rails.	Silo Forms,	Tools, Finishing.
Instruments, Testing.	Molds (Building Tile,	Reinforcement, Ex-	Monolithic.	Tracks.
Joint Machines.	Block, Burial Vault,	panded Metal.	Silo Roofs.	Track Material.
Laboratory Equip-	Etc.).	Reinforcement Metal	Silo Stave Machines	Transformers, Electric.
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Laundry Tub Molds.	Name Stamps.	Reinforcement,	Smokestacks.	Trucks, Hand and
Letters and Figures.	Oil Storage.	Metal	Spraying Equipment.	Lift.
Lights, Carbide.	Oils and Lubricants.	Reinforcement,	Stampings, Metal.	Trucks, Power.
Lights, Roof and	Ornamental Molds.	Special.	Stamps, Name.	Unloaders.
Sidewalk.	Packing, Hydraulie.	Reinforcement	Steam Shovels.	Valves.
Lime Boxes.	Packing, Piston.	Specialized.	Steel, High Speed.	Vibrators.
Lime Hydrators.	Packing, Sheet.	Reinforcement	Steel, Manganese.	Wall Forms and
Loaders, Car, Truck	Packing, Sheerheat.	Machinery.	Stokes, Automatic.	Madding.
and Wheel.	Paints and Coatings.	Pallet Facing	Stone Backing.	Welding Equipment.
Locomotive Cranes.	Pallets, Steelor Wood.	Machines.	Storage Bins.	Waterproofing and
Locomotives.	Perforated Metals.	Pipes.	Stripers.	Dampproofing.
Machine Shop	Pipe Iron.	Machines.	Stuccos.	Weighing Equipment.
Equipment.	Pipe, Machines.	Pipe (Concrete)	Stucco Machines.	Welding, Electric.
Magnetic Separators.	Pipe (Concrete)	Machines.	Sun Dials.	Welding, Oxy-
Measuring and	Pipe Molds.	Pneumatic Tools.	Surfacing Machinery.	Acetylene.
Weighing Devices.	Posts, Fence Molds	Posts, Fence Molds	Tamers, Automatic.	Well Curbing Ma-
Metal Lumber.	and Machines.	and Machines.	Tanks, Elevated and	chines and Molds.
Mills, Color.			Storage.	Wheelbarrows
Mixers.			Tanks, Steel.	Winches.
Mixers, Batch.				Wrenches.
Mixers, Color.				

Firm Name. \_\_\_\_\_

Individual. \_\_\_\_\_

Title. \_\_\_\_\_

Address. \_\_\_\_\_

City. \_\_\_\_\_

State. \_\_\_\_\_



# ALLEN SAND TANKS

for

EXACTING GRADATION  
CLASSIFICATION  
SILT REMOVAL  
DEWATERING

Accurate classification to produce CONCRETE, MASON and ASPHALT sands to meet the most rigid state and local specifications.

We can determine the proper classifying and settling areas required to give you the maximum quantities of each grade if we know (1) the average screen analysis of your sand, (2) the volume of water accompanying the sand, (3) the products you wish to produce.

More than fifty (50) ALLEN TANKS are recovering fine sand previously lost in the overflow of drags, screws and other types of mechanical classifiers.

ALLEN TANKS are built in large sizes, thus giving ample settling areas to drop out the finest sizes but permitting the overflow of silt.

We Invite Inquiries

**ALLEN CONE & MACHINERY CORP.**  
ENGINEERS  
30 Church St. New York City

## PRODUCE HIGH EARLY STRENGTH

Normal, all-purpose, masonry, plastering and stuccoing cements under the several blank patented processes.

*Inquiries invited from producers of cement, lime and allied products.*

Investigations and experimental tests carried out at plants of interested producers by technical experts familiar with processes at no cost to producer.

### CEMENT PROCESS CORP.

Cement Plants Division  
Allentown, Pa. Main Office  
90 Broad Street New York Lime Plants Division  
P.O. Box 574 York, Pa.

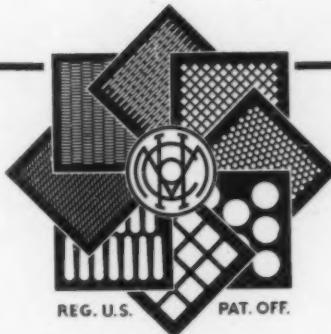
MEXICAN BRANCH  
P.O. Box 515, Mexico City, Mexico

## LINK-BELT VIBRATING SCREEN

*For Accurate Screening and Sizing*



- All materials, fine or coarse, light or heavy... clay, gravel, sand, ores, crushed stone, coal, coke, fertilizer, grain, sugar, chemicals, pulpwood chips, etc... yield to the wizardry of the mechanically-vibrated Link-Belt Vibrating Screen, and classify themselves in strict accordance with their size. Its uniform vibration keeps the meshes open, and makes the screen's entire screening surface 100% effective. Send for Book No. 1562. Address Link-Belt Company, Philadelphia, Chicago, Indianapolis, Atlanta, San Francisco, Toronto, or any of our offices located in principal cities.



## Production Is Up . . . . . How Is Your PERFORATED PLATE?

Don't be handicapped on a large order by perforated plate that must be replaced. Take stock of your equipment now, and then to be sure of good perforated metals and prompt service, order what you need from Hendrick.

### HENDRICK MANUFACTURING CO.

47 Dundaff St., Carbondale, Pa.

SALES OFFICES IN PRINCIPAL CITIES  
PLEASE CONSULT TELEPHONE DIRECTORY

Makers of Elevator Buckets of all types, Mitco Open Steel Flooring, Mitco Shur-Site Treada and Mitco Armogrids. Light and Heavy Steel Plate Construction.

# STURTEVANT

## Air Separators



183  
STURTEVANTS  
sold on approval  
for Cement.  
Not one rejected

"HIGH EARLY"  
and regular  
cement  
1500-3300  
S. S. Area

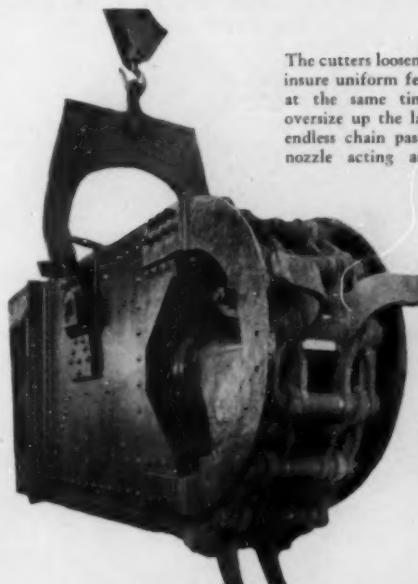
Engineered installations for raw or clinker show  
25 to 100% capacity increase.

STURTEVANT MILL CO. Harrison Square BOSTON, MASS.

## Pump More Solid Material!

**Y**OU can't judge production by pump capacities. Profits lie in lowered cost of the actual material produced.

And in actual service, Eagle "Swintek" Screen Nozzle Ladders have shown amazing production increases over plain suction with operating costs often cut more than in half.



The cutters loosen deposit and insure uniform feed of solids, at the same time carrying oversize up the ladder as the endless chain passes over the nozzle acting as a screen.

*Our descriptive bulletin will acquaint you with the Eagle "Swintek" advantages; send for your copy.*

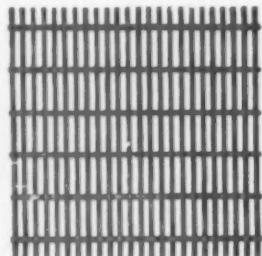
**Investigate!**  
THE EAGLE WASHERS  
For Clean Sand and Gravel

EAGLE IRON WORKS  
Des Moines, Iowa

**E A G L E**

The nozzle head manufactured only under Eagle patents. It has no equal.

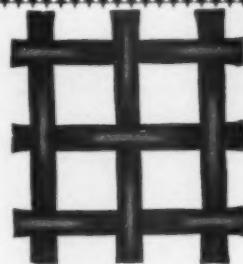
**"Swintek" Screen  
Nozzle Ladder**



Rolled Slot  
**ALLOY**  
**No. 2**

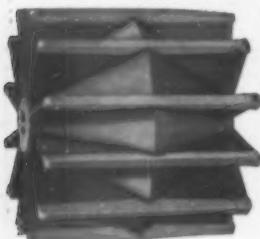
## STAR PERFORMERS

CLEVELAND SCREENS are star performers—returning larger capacities, increased profits and more accurate separations at lower cost. Cleveland Screens save money with the initial investment because, if they are made of the longer-wearing, wear-resisting ALLOY NO. 2—Cleveland Screens stay on the job long after ordinary screens would have been replaced.



2 Mesh .162 Ga.

MORE  
PROFITS  
FOR YOU



## CONVEYORS LAST LONGER

where SPROUT-WALDRON Wing Pulleys are used. The same is true of your Elevator belts.

Material conveyed cannot lodge between belt and pulley to cut your belts.

Interchangeable with standard pulleys.

Write for catalog.

**SPROUT, WALDRON & CO., INC.**

1221 SHERMAN ST., MUNCY, PA.

Elevating, Conveying and Transmission Equipment

## WILFLEY Centrifugal SAND PUMP

PATENTED  
for Slurry  
for Sand Tailings



ELIMINATION of stuffing box has done away with many troubles common to centrifugal pumps. Pump maintains extraordinary efficiency.

Pumping parts unusually heavy, insuring long life. Cleaning out pump or changing wearing parts requires only a few minutes.

Described and illustrated in Catalog No. 8  
A. R. Wilfley & Sons, Inc., Denver, Colo., U. S. A.  
New York Office: 1775 Broadway

## McLANAHAN EQUIPMENT

for ROCK—  
SAND—GRAVEL

Single and double roll and jaw crushers, hammer mills, super dry pans, steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists. Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

McLanahan & Stone  
Corporation  
Established 1835  
Hollidaysburg, Pennsylvania



## SCHAFFER POIDOMETERS

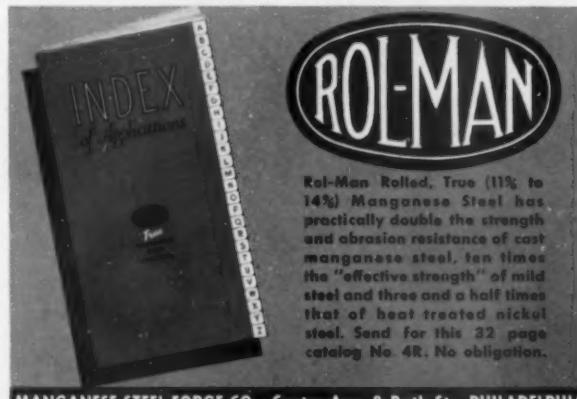
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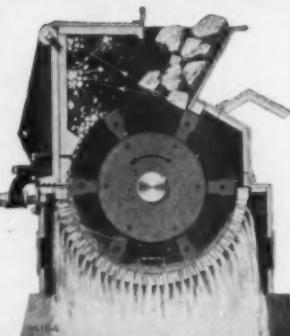
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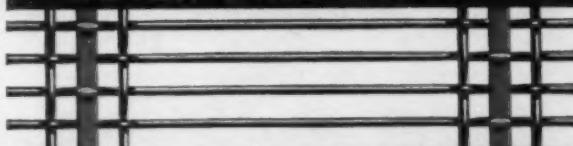
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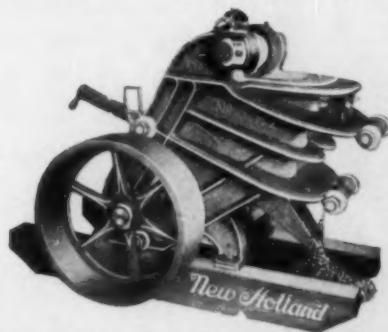
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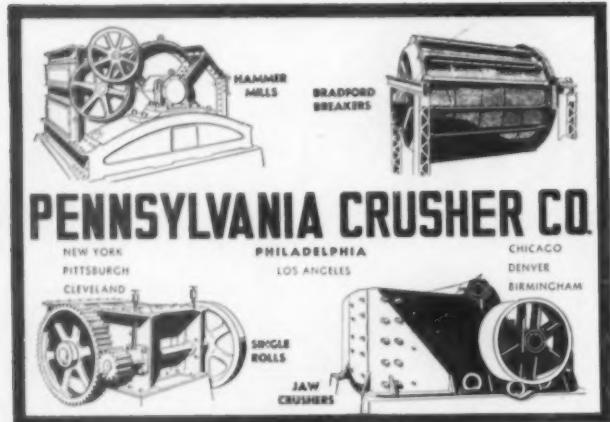
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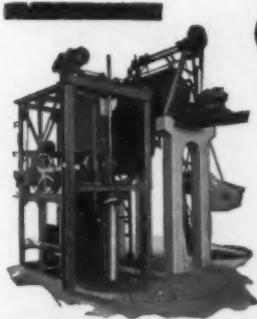
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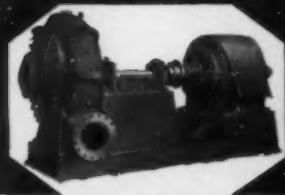
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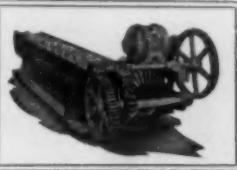
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12-Jaw Crushers—No. 1436 Cedar Rapids; No. 1538 Universal; 18x24 Reliance; 24x36 Farrell, Buchanan; 36x42 Traylor; Farrell; 42x60 Farrell; 48x60 Allis-Chalmers; 48x72 Buchanan.  
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 Plant and Shops at Newark, N. J., cover 8 acres of ground.

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500	G. E.	Synch.	440	1200
450	West.	Synch.	440	257
450	West.	SI. Rg.	2300	875/700
400	G. E.	SI. Rg.	2300/550	390
400	West.	SI. Rg.	2300/550	290
400	G. E.	SI. Rg.	440/220	505
400	West.	SI. Rg.	2300	514
400	G. E.	SI. Rg.	2300	885
300	A1. Ch.	SI. Rg.	2300/550	585
250	G. E.	SI. Rg.	4000/2300	257
250	West.	SI. Rg.	440/220	585
250	F. Morse	SI. Rg.	2300/550	1200
225	El. Machy.	Synch.	4150/2300	450
220	G. E.	Synch.	2300	900
200	West.	Synch.	440	514
200	West.	Synch.	2300/550	1800
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Complete stock list on request.

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Sullivan Drill Sharpener Class "A" for hammer-forging drill bits and shanks, heavy duty compressed air machine for making and resharpening rock drill and hammer drill bits by hammering. Equipped with two air hammers and compressed air valve, also blow gun.  
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Steel and wood, stiff leg, or guy; from 2 to 50 tons, including 2 steel stiff legs.

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New dryers made for all purposes.  
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50 Tons per Hour  
With G.E. 100 H.P. Supersynchronous  
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- 10 Is free of all internal stress . . .
- 11 LASTS LONGER — GIVES GREATER DOLLAR VALUE.

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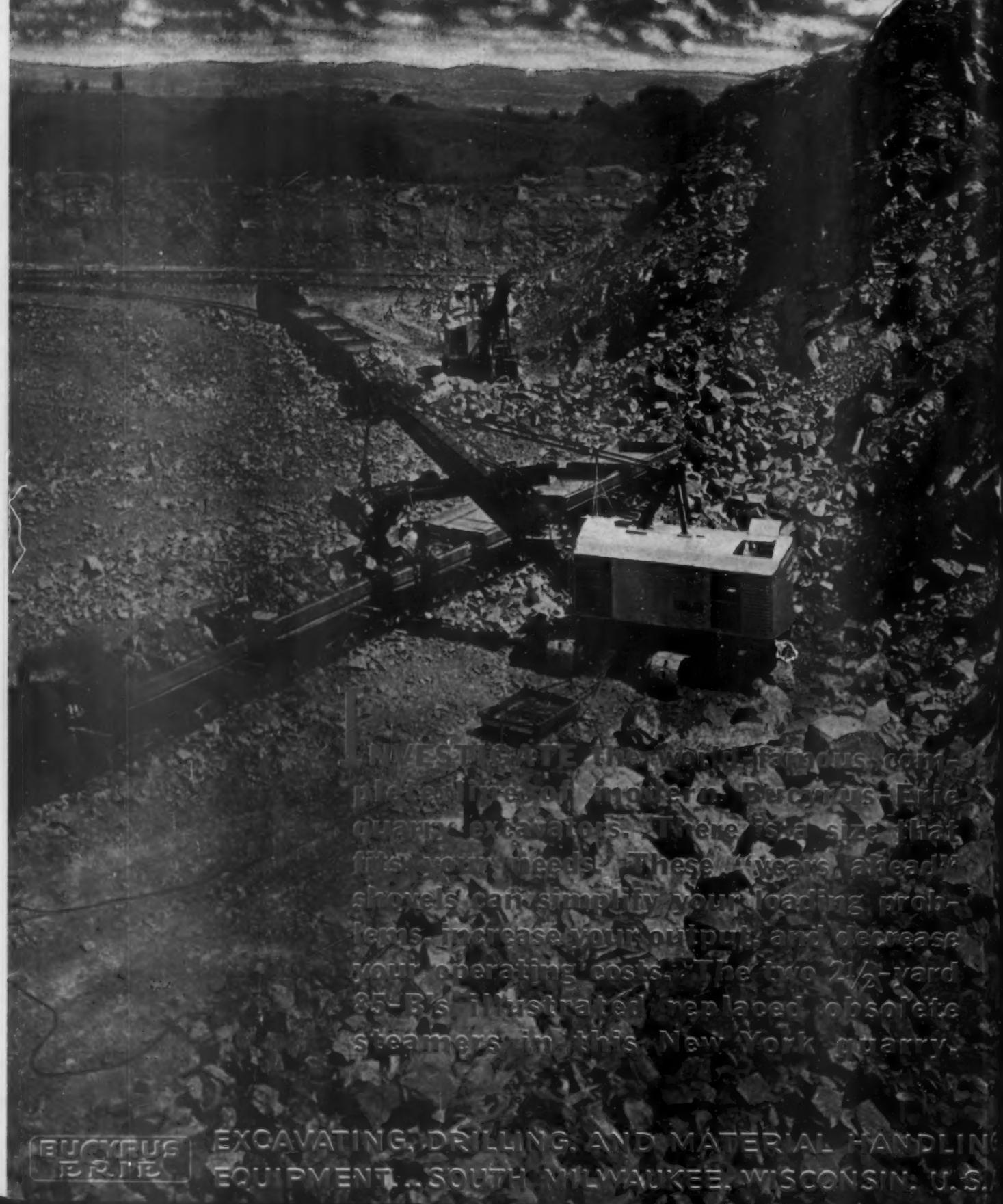
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